Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXII May 20, 1931 No. 4

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Published bi-weekly on Wednesday for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

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COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

H. W. Baumgartner, *President*
V. E. Larsen, *Vice-President*
S. A. Phillips, *Directing Editor*
W. E. Trauffer, *Asst. Editor*
Harry F. Utley, *Asst. Editor*
Mat F. Beisber, *Asst. Editor*

Editorial Field Representatives:
A. C. Petersen
S. D. Smith

Advertising Representatives:
Chicago
W. A. Buschman L. C. Thaon
Telephone *Harrison 9357*
Chicago, Ill.

New York
E. M. Buck, 68-43 Clyde St.
Telephone *Boulevard 8-5259*
Forest Hills, L. I., N. Y.

Cleveland
W. E. Coates, 1258 Marlowe Ave.
Lakewood, Ohio

Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central, and South America; elsewhere $1 additional for each year. Single copies 20 cents.

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Vol. XXII CHICAGO, MAY 20, 1931 No. 4

Lime Association in Convention June 3-4

PROGRAM IS BEING PREPARED

The National Lime Assn. is completing preparations for its thirteenth annual convention to be held June 3 and 4 at the New Greenbrier Hotel, White Sulphur Springs, W. Va.

Norman G. Hough.

Present officers of the association are Norman G. Hough, president; R. P. Wilton, secretary-treasurer; W. V. Brumbaugh, assistant secretary - treasurer; Bernard L. McNulty, chairman of the board of directors. The above officers and J. M. Deely, J. M. Gager, H. B. Mathews and Reed C. Bye form the executive committee. Election of new officers, or reëlection of the present list, will take place at the meeting next month.

An inspiring program is being prepared and will be released to members of the association within a few days, according to Bernard L. McNulty of the Marblehead Lime Co. of Chicago, chairman of the association's board of directors.

Registration of about 100 is expected at the convention. It is expected that several of the delegates and guests will remain over at the West Virginia resort for the annual convention of the National Fertilizer Assn. which also will be held at the New Greenbrier Hotel June 8 to 12, inclusive.

Los Angeles to Vote on Cement-Quarry Proposal

Los Angeles voters will decide at a city election June 2 whether or not the Alphonse Bell interests are to be permitted to quarry and crush limestone in the Santa Monica mountains near that city.

The Bell plan, which has agitated residents of the coast city since its inception several months ago, would transport the raw material by boat southward to the cement plant, which would be erected near San Diego. Special zoning privileges were granted the concern by the Los Angeles council some months ago, the area having formerly been restricted as residential property. Since then 40,000 persons, who claimed their homes would be damaged by the quarrying operations, have signed petitions opposing the proposal.

Plant's Output Taken by State for Road Building

The Iowa Falls Sand & Gravel Co. has completed its new plant at Iowa Falls, Ia., which is now in full operation and has a capacity of 20 cars of washed sand and gravel daily. A railway spur to the plant handles the outgoing products of the company. The sand and gravel are washed with water pumped from the Iowa River and the plant is operated by gasoline and electric power. A representative of the state highway commission is stationed at the plant to inspect the output and see that it comes up to the standards required under contracts. All of the present output is being taken by the state for road building.

Premier Granite Erects New Finishing Buildings

The Premier Granite Co. is completing the erection of buildings at Llano, Tex., in which it will finish the gray granite which it quarries about twelve miles distant. The equipment is extensive and modern, and represents a heavy investment.

To Construct Lime Plant at Little Rock, Report

The Big Rock Stone & Material Co., Little Rock, Ark., is to erect lime plant at Garland Ave. and Spring St, Little Rock, it is reported. The plant will produce five carloads of construction lime daily.

U. S. Gypsum Co. Awards Contract for Addition

The U. S. Gypsum Co. has let the contract to the H. K. Ferguson Co. of Cleveland for an addition to the company's plant at Warren, O. The building is to be completed within two months and will contain 24,000 sq. ft. of floor space.

Quarry Blast Loosens 75,000 Tons of Stone

27 WELL-DRILL HOLES LOADED

On Saturday, April 11, a primary blast was made in the limestone quarry of the Cumberland Portland Cement Co. at Cowan, Tenn., which it is estimated, brought down 75,000 tons of stone. Twenty-seven well-drill holes 6 in. in diameter and spaced 18 ft. apart were loaded. The holes were an average of 22 feet back from the face of the quarry in a single row, and ranged in depth from 65 to 84 ft. in solid limestone. A total of 18,000 lb. of Burton explosives was used in the shot, consisting of 5,000 lb. of 75 per cent. quarry gelatin, 10,000 lb. of 60 per cent. Burtex A dynamite, and 3,000 lb. of 40 per cent. ammonia dynamite. Approximately 2,000 ft. of Cordeau-Bickford safety fuse was used in firing.

The drilling, loading and firing of the blast were under the supervision of L. B. Reifsneider, quarry superintendent for the cement company, who was assisted in the loading by Service Engineer Dunn, of the Burton Explosives Co., Inc., Nashville, Tenn. The results obtained were highly satisfactory and produced sufficient limestone to provide at least six months' supply for cement manufacturing purposes.

Plan Erection of Cement Plant in South Carolina

State Senator Edgar Brown of Barnwell, S. C., has announced that preliminary plans are in progress for the erection of a hydro-electric dam and a Portland-cement plant near St. George, S. C. Large marble deposits would supply raw material. South Carolina and New York capital is said to be behind the proposed project.

Pioneer California Sand and Gravel Plant Sold

Sale of the pioneer Russian River Gravel Co. of Healdsburg, Cal., to the Basalt Rock Co. for $100,000 was announced recently by John D. Grant, operator of the Healdsburg firm.

The gravel company has been owned and administered by the Grant family since 1906. Prior to that time its holdings were worked by builders of the Northwestern Pacific railroad.

Leaders in Pre-Mixed Concrete Field Meet

SET 1932 CONVENTION DATE

The board of directors of the National Ready-Mixed Concrete Assn., met on Friday, May 15 at the Congress Hotel, Chicago, Ill., to discuss activities for the current year and ways and means of expanding the activities of the association. A closed meeting of the directors in the morning was followed by a luncheon and an open meeting in the afternoon.

The afternoon meeting was presided over by J. E. Burke, president of the association, under whose direction some interesting discussion developed. The question of the responsibility of the concrete producer for concrete specified by strength or by mix was one of the most important subjects.

It was decided to prepare and distribute instructive and promotional literature and to conduct an active membership campaign. Each member present agreed to do what he could to induce operators in his district to join the association. The editors of the two trade-papers reaching this field, PIT AND QUARRY and *Rock Products*, both joined as associate members.

A proposal was then made that the association undertake an exhaustive series of strength tests, to be made at member plants, of concrete taken from the plant mixer, from the truck at the point of delivery, and from the forms as deposited. To avoid placing a heavy financial burden on the association a number of the members agreed to conduct such tests at their plants in conjunction with their regular testing work, and to bear the expense.

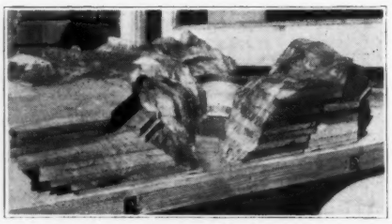
It was announced that the second annual convention of the association would be held on Jan. 25 and 26, 1932 at the Wm. Penn Hotel, Pittsburgh, Pa., preceding the annual convention of the National Sand and Gravel Assn. which is to be held at the same place on Jan. 27, 28 and 29. The first day of the convention, Jan. 26, is to be devoted entirely to association affairs with the annual banquet in the evening. The sessions will close at 1:30 p. m. Jan. 26, with a meeting of the board of directors. It was then tentatively agreed that a meeting of the executive committee be held in October or November of this year to prepare final plans for this convention. The exact date and place will be announced later.

A list of the attendance follows:

V. P. Ahearn, executive secretary, National Ready Mixed Concrete Assn.; Paul P. Bird, pres., Boston S. & G. Co., Boston, Mass.; J. E. Burke, gen. mgr., Ready-Mixed Concrete Co., Pittsburgh, Pa.; H. S. Davison, sec.-treas., J. K. Davison & Bros., Pittsburgh, Pa.; Walter E. Hart, mgr., Structural & Technical Bureau, P. C. A.; D. Hyman, pres., Buffalo Gravel Corp., Buffalo, N. Y.; F. R. McMillan, research director, P. C. A.; S. A. Phillips, directing editor, PIT & QUARRY; Geo. W. Renwick, vice-pres., Chicago Gravel Co., Chicago, Ill.; Nathan C. Rockwood, editor, *Rock Products*; A. R. Shiely, vice-pres., J. L. Shiely Co., St. Paul, Minn.; H. F. Thomson, vice pres., General Material Co., St. Louis; W. E. Trauffer, asst. editor, PIT AND QUARRY; Stanton Walker, research director, National S. & G. Assn.; R. B. Young, consulting engineer, Toronto Ready-Mixed Concrete Co., Toronto, Ont.; Chas. H. Young, consulting engineer, Landers, Morrison & Christianson, Minneapolis, Minn.

Builds Model Dam Site

The above partially completed model of the Hoover Dam and surrounding territory was built for the purpose of making a study as to the most desirable location for placing the crush-



Model of Boulder Canyon and dam.

ers, the aggregate handling equipment, the concrete mixers and other construction equipment. The model is made so that the dam can be removed for further study.

Wilkes-Barre Operator Acquires Another Plant

The Concrete Aggregates Corp., of Wilkes Barre, Pa., recently took over the Wyoming Sand & Gravel Co., formerly known as the Lanesboro Sand & Gravel Co., Lanesboro, Pa. John H. Hutchins, superintendent, will have charge of the operation of the plant.

New Indiana Producing Company Takes Deposit

The Hamilton-Tipton Gravel Co. recently organized at Noblesville, Ind., has acquired a deposit in Hamilton County, on the White River, near Noblesville, on which it will construct a plant, according to press reports.

Reveals New Process of Making Glass from Slag

A new process of manufacturing glass from blast-furnace slag and common building sand was announced at Auburn, Ala., recently by Dr. C. A. Basore, professor of chemistry and industrial research at Alabama Polytechnic Institute. Through his discovery Dr. Basore said he believed thousands of tons of molten slag now going to waste may, by the addition of sand, be manufactured into glass in commercial quantities.

Pick Pittsburgh for 1932 S & G Gathering

MEETING OF DIRECTORS HELD

The 1932 convention of the National Sand & Gravel Assn. will be held Jan. 27-29 at the William Penn Hotel, Pittsburgh, Pa.

This was decided by the board of directors of the association, which met May 13 and 14 at the West Baden Springs Hotel at West Baden, Ind.

In the absence, due to illness, of both President Robert J. Potts and Vice-President H. V. Owens, the meeting was presided over by John Prince. Reports from directors representing various sections of the country were heard. While the consensus of opinion was far from optimistic over business conditions at present, the feeling prevailed that definite improvement may be expected before many months elapse.

Announcement was made that thirteen new members had been added to the association since Oct. 1 of last year.

The Jackson River plant of the Stewart Sand & Material Co. of Kansas City, Mo., was proclaimed winner of the 1930 safety contest, having operated 108,753 man-hours without an accident. Second honors went to the Potts-Moore Gravel Co. of Waco, Tex. This company operated 79,881 man-hours and likewise had no lost-time accidents. Of the 76 operating companies participating in the event, 32 had no accidents involving a loss of time, it was announced.

Registration included the following: V. O. Johnston, Lincoln, Ill.; C. F. Mullen, Cleveland, O.; Paul P. Bird, Boston, Mass.; D. Hyman, Buffalo, N. Y.; E. E. Crozat, New Orleans, La.; John Prince, Kansas City, Mo.; M. A. Neville, Lafayette, Ind.; Mike Garber, Lorain, O.; R. C. Fletcher, Des Moines, Ia.; H. M. Davison, Milwaukee, Wis.; S. Stepanian, Columbus, O.; J. M. Settle, Louisville, Ky.; V. P. Ahearn and Stanton Walker, Washington, D. C.; Harold T. Smith, New York, N. Y.; H. S. Davison, Pittsburgh, Pa., and F. W. Renwick, Chicago, Ill.

Canadian Gypsum Plans to Construct New Plant

Canadian Gypsum Co., Ltd., of Toronto, a subsidiary of the United States Gypsum Co., has plans in progress for the construction of a plant at Willow Grove, Ont., this summer. The new plant will be ready to start production by autumn.

Builds New Ready-Mixed Plant at Mason City, Ia.

The Hankel Construction Co., of Mason City, Ia., has installed a plant for the production of ready-mixed concrete, with a capacity of 400 cu. yd. per day.

Promotions Announced by Universal Gypsum

BROWN, CHAMBERLAIN ADVANCED

The Universal Gypsum & Lime Co. announces the promotion of W. S. Brown to its general sales department in Chicago. Mr. Brown has been identified with the Universal company for the past several years as a salesman and recently as sales manager of the northwestern division. His broad experience in the gypsum and lime industries and his knowledge of field conditions and dealers' problems make him well qualified to handle his new work.

W. S. Brown.

The company also announces the appointment of George H. Chamberlain as manager of the northwestern division, to succeed Mr. Brown. Mr. Chamberlain is also an old employee of the company and has been in charge of the Milwaukee district.

The changes show a definite expansion program on the part of the Universal company, it recently having opened a new division sales office in Pittsburgh, with O. C. Cronwell in charge. It has also opened new offices in Dallas, Tex., and Minneapolis, Minn.

New Plant of Sheridan Gravel Co. in Operation

The new plant of the Sheridan Sand & Gravel Co. at Sheridan, Ill. went into production recently, and is shipping four grades of gravel and three sizes of sand.

The new plant, costing $100,000, is situated along the Fox River, about one-half mile southwest of Sheridan, and takes the place of the old plant, just north of it, which was abandoned. It is built of steel and concrete, and is operated by electricity two 300-hp. motors having been installed.

Provision has been made for loading both railroad cars and trucks. A new spur track, about half a mile long, was built by the Burlington Railroad to reach the new plant.

Sand-and-Gravel Plant in Progress in Georgia

The Richmond Sandgravel Co., a new corporation chartered in Georgia, will erect a sand-and-gravel plant and will begin operations in Augusta, Ga., shortly. Officers of the company are John G. Ehrlich, president, and John W. Wilson, vice president.

The owners have purchased 11½ acres adjacent the beltline railroad and the New Savannah road, where the plant will be erected, the work to begin as quickly as material can be placed on the site. Most of the machinery has already arrived. B. O. Edmondson will be superintendent.

The plant will have a capacity of 20 cars of sand and gravel per day. Production will start by June 1, it is said.

Mr. Ehrlich is also president and treasurer of the Southern Silica Mining & Mfg. Co., of Columbia, S. C. Mr. Wilson is vice president of S. W. Wilson & Sons, large operators in the sand and gravel business in South Carolina. Both officers have been in business for 12 years.

Operators on Tennessee River Report Activity

With the Tennessee River remaining at the proper stage for boat movement and dredging, sand-and-gravel operators at Knoxville, Tenn., have been working at capacity during the past several weeks. The Oliver King Sand & Lime Co. has been particularly active, large quantities of material having been moved by barge to its shore plant at Knoxville.

Consolidated Feldspar Acquires Grinding Plant

The Consolidated Feldspar Corp. of Trenton, N. J., has purchased the Los Angeles grinding plant of the Flynt Silica & Spar Co. The Consolidated company will operate the newly-acquired plant in connection with its other plants. It is one of the leading American producers of ceramic materials.

To Construct Unloading Dock at Benton Harbor

The Ireland & Lester Sand & Gravel Co. of Benton Harbor, Mich., is preparing to build a dock for unloading stone and gravel between the St. Joseph River and the Morrison channel outlet on the boundary of the twin cities of Benton Harbor and St. Joseph. The company's office and depot are now located at West Main St., Benton Harbor, Mich.

Quarries Company Lets Contract for Dump Cars

The Thunder Bay Quarries Co., which is proceeding with the erection of a new crushed-stone plant on Lake Huron in northern Michigan, has awarded a contract for six 25-cu. yd. two-way air-dump cars to the Koppel Industrial Car & Equipment Co.

Syndicate Will Prospect for Sulphur in Louisiana

The Hercules Sulphur Exploration Syndicate, of which H. C. Fine is president, has leased 10,000 acres near Wiggins, Miss., and will prospect for sulphur deposits, it is reported.

P. C. A. Holds Spring Meeting at New York

CONCRETE PAVING INCREASES

The spring meeting of the Portland Cement Assn. was held May 11, 12 and 13 at the Hotel Biltmore, New York, N. Y., approximately 300 representatives of the cement industry being registered. As is customary, only representatives of member companies were permitted to attend the sessions.

Meetings of the twelve association standing committees occupied the first day of the meeting. On Tuesday, May 12, was held the general session for the discussion of technical problems and cement-mill practice. The feature of this session was a paper by E. S. Ernst, chief chemist, Dewey Portland Cement Co., Davenport, Ia., entitled "Commercial Application of Closed-Circuit Wet Grinding of Cement Raw Materials."

At the luncheon on Tuesday, the formal award of the safety trophies to the winners in the 1931 contest was made.

The business session was held on Wednesday, May 13, the final day of the meeting. According to Wm. M. Kinney, vice-president and general manager of the association, who made one of the principal addresses at the business session, awards for concrete rural roads for the first four months of this year exceed by more than 55 per cent. those for the same period of last year. He declared that the record of 10,250 miles of concrete pavement awarded to contract last year will be eclipsed easily in 1931. Contracts placed up to May 1 call for the construction of 57,000,000 sq. yd., the equivalent of about 5,400 miles of 18-ft. pavement.

The association banquet, a customary feature of the meetings for many years, was not held in connection with the meeting. On Tuesday, May 12, at 7 p. m., however, a dinner took place at which only the active head or accredited representative of each company was present.

A. L. Worthen Speaks at N. Y. Association Meet

A. L. Worthen, president of the National Crushed Stone Assn., was the chief speaker at a meeting of the New York State Crushed Stone Assn., held May 1 at Rochester.

New stone sizes and standard forms of sales contracts were discussed by the association members, 19 of whom were present at the meeting.

Idaho Lime Operator Swings Into Production

The plant of the HiWay Lime Co. at Pebble, Ida., has started operation for the season. Bulk lime and hydrate are being manufactured.

National Slag Assn. Meets at Cleveland

FORMER OFFICERS REËLECTED

At the fourteenth annual meeting of the directors of the National Slag Assn. at its headquarters in Cleveland, O., the following officers were elected to succeed themselves: C. L. McKenzie, president, Duquesne Slag Products Co., Pittsburgh, Pa., president; C. E. Ireland, president of Birmingham Slag Co., Birmingham, Ala., vice-president;

C. L. McKenzie.

H. J. Love.

and H. J. Love, Cleveland, secretary-treasurer. Papers were presented at the meeting and attention focused on a report of Director of Research Fred Hubbard, Youngstown, O. A program of research outlined for the coming year and authorized at this meeting is larger than usual.

Opens Crushed-Stone Plant Near Danville, O.

John Cashman & Son, of Lynchburg, Ohio, recently opened a new stone quarry and plant near Danville, Ohio, and production was scheduled to begin some time this month. The Danville plant, which will be operated by Donald Cashman, has a capacity of 275 tons daily.

California Marble Firm Manager Dies Suddenly

Dudley M. Mills, vice-president of the Musto-Keenan Marble Co. and manager of its business in Los Angeles, Cal., died suddenly of heart disease, without any previous illness, at his home in that city recently. He was born in New York, in 1878, and went to California in 1906. Two years later he became vice-president of the Musto-Keenan Marble Co.

Form Stucco and Plaster Institute in California

Announcement has been made of the organization of the Stucco and Acoustic Plaster Institute with headquarters at 1937 Myra Ave., Los Angeles. The Institute has been functioning for several weeks but official announcement was withheld until its success was assured.

According to Carl W. Spaulding, manager of the institute, the sixteen leading southern California manufacturers have become affiliated with the organization, whereby, through cooperative and concerted effort, they may bring about a better understanding of the uses of stucco and acoustic plaster.

Cement-Plant Employees Injured in Auto Crash

David Fortuin, son of Morris Fortuin, general manager of the Pennsylvania-Dixie Cement Corp. and four other employees of the company were injured April 16 in an auto accident, which occurred while the men were returning to Ithaca, N. Y., after attending the regional safety meeting of the Portland Cement Assn. at Albany. None was critically hurt, however.

Besides Mr. Fortuin, the accident victims were Clifford Dickerson, Kenneth Ford, Floyd Warner, and Mettis Wolf.

Trap-Rock Quarry Blast Uses 26 Tons of Powder

Approximately a quarter million tons of rock were brought down last month in a blast at the Reeds' Gap trap-rock quarries of the Connecticut Quarries Co., New Haven, Conn. Two tunnels, each over 50 ft. long, were employed in loading approximately 26 tons of explosive.

Zebulon Davis, Founder of Cement Company, Dies

Zebulon W. Davis, 87, founder, in 1892, of the Diamond Portland Cement Co. of Cleveland, O., died May 3 at his home in Canton, O., of heart disease. Mr. Davis was also an inventor of a gasoline lamp and stove.

Windstorm Damages New Michigan Gravel Plant

A severe windstorm early this month caused considerable damage to the tipple of the new sand-and-gravel plant being erected at Centerville, Mich., by the Michigan Concrete & Material Co. Repairs have been completed, however, and the company is now installing the screens and conveyors. A spur track from the Michigan Central railroad has been installed.

Production will start some time next month, it is reported.

Builds $70,000 Concrete Plant at Lancaster, Pa.

Ready-Mixed Concrete Co., Lancaster, Pa., is proceeding with the construction of a $70,000 ready-mixed concrete plant which it expects to have in operation late in May. Fifteen men will be employed. Arthur M. Dives, Reading, Pa., is owner.

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EST. 1907
Graham Bros., Inc.
1512 West Seventh St. • • Long Beach, California

Aggregates Producer Is Booster of Local Buying

Graham Bros., Inc., 1512 West Seventh Street, Long Beach, Cal., producer of crushed stone and sand and gravel, has recently taken large display advertisements in Long Beach newspapers for the purpose of emphasizing the importance of buying local products, particularly during the present business depression.

One such advertisement, captioned: "Make Your Dollar Support a Local Payroll," points out to the reader how patronage given to Graham Brothers will aid local residents. There is nothing vague about the advertisement or its promise, as the reproduction shown above indicates.

National Gypsum Starts Producing New Wallboard

The National Gypsum Co. of Buffalo, N. Y., started production this month on a new gypsum wallboard product to be marketed under the brand "Gold Bond." The new board carries a grained finish similar to wood and may be waxed, shellacked or lacquered. The new product is being manufactured at the company's plants at National City, Mich., and Clarence Center, N. Y.

Crushed-Stone Company Organized at Piqua, O.

The Piqua Stone Products Co., a subsidiary of Ohio Marble Co., Piqua, O., was recently formed to produce crushed stone for road-building purposes. Mrs. M. F. Hall, president; A. Acton Hall, vice-president and general manager; and George W. Berry, secretary-treasurer of Ohio Marble Co., will also direct the affairs of the new company.

Form Cement Co. With $19,000,000 Capital

OFFICES AT SAN FRANCISCO

Announcement of the recent incorporation, at Wilmington, Del., of the San Jose Cement Co. with authorized capital of approximately $19,000,000 has aroused considerable interest in the industry, although no information has been made available either as to the plans of the new company or its officers and incorporators.

An office has been established in San Francisco, according to the *San Francisco Chronicle*, where it was stated recently that full information regarding the company's future operations will be given out by June 1.

With the cement industry in California operating at only about 30 per cent. of capacity considerable surprise has been expressed that new capital would enter the field at this time.

As a result the rumor has spread that the company has been organized to purchase and consolidate several companies now in operation.

For a number of months negotiations were on to merge a number of the leading Northern California cement companies. They never reached the point, however, where final details were worked out. And from interests associated with the companies included in the proposed merger it is learned that the formation of the new concern is in no way connected with that particular deal.

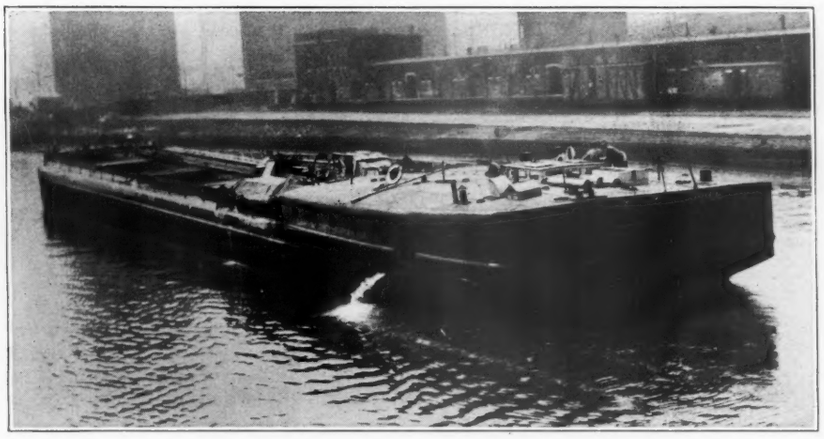
New Storage Bins Being Built at Illinois Plant

Construction is proceeding on two storage bins, each having a capacity of approximately 150 tons, at the plant of the Lincoln Sand & Gravel Co. at Lincoln, Ill. These are being equipped with bin gates which will discharge about three tons of sand or gravel per minute, thus permitting the loading of trucks to their maximum load in from sixty to ninety seconds. After the bins are put into operation, construction will begin on two or more so that all sizes of material will be on hand for immediate delivery.

A fifteen-ton truck scale has also been installed at the pit, making it possible for a truck to load and weigh out within three minutes after its arrival at the company's plant.

The company has recently made arrangements with local retailers whereby it will sell material at the plant if the consumer wishes his favorite hauler to deliver the material for him, or, if consumer wishes he may call the company's office and the material will be delivered.

The company has placed J. C. Johnston in charge of this department.



The motor ship "Material Service" on the Chicago River.

Producer Suffers Loss as Fire Damages Vessel

The Lampe Construction & Terminal Co. of Lorain, O., dredge contractor and excavator of sand and gravel from Lake Erie, recently suffered a loss of $17,000 when its dredging vessel caught fire. The boat is now being rebuilt and will be ready for service again this summer.

About a year ago the company lost another vessel valued at $20,000 when it sank in the lake.

Barge Hauls Aggregates to Chicago Firm's Yards

Aggregates produced at the Paul Ales plant of Material Service Corp. located a few miles south of Chicago are transported to the various yards of the company within the metropolitan district by the self-unloading motorship *Material Service*, a view of which is shown in the accompanying illustration. The barge, however, is not owned by the Material Service Corp., it being owned and operated by the Leathem Smith-Putnam Navigation Co. of Chicago under contract.

The navigation company is headed by Leathem D. Smith, well-known in the industry as a producer of materials and as a developer of self-unloading vessels. Major Rufus W. Putnam is secretary-treasurer.

Pre-Mixed Concrete Co. Formed at Oakland, Cal.

Makin & Kennedy and the Melrose Building Materials Co., both of Oakland, Cal., have organized the Quality Concrete Co., to specialize in the manufacture of ready-mixed concrete. Offices will be located in Builders Exchange Bldg.

BUILDING AND ALTERATION PERMITS IN MARCH, 1931, COMPARED WITH MARCH, 1930, AND FEBRUARY, 1931

State	Mar., 1931	Mar., 1930	Feb., 1931	State	Mar., 1931	Mar., 1930	Feb., 1931
Alabama	$ 596,700	$ 550,021	$ 277,987	Nebraska	$ 774,000	$ 2,035,160	$ 1,001,814
Arizona	1,000,198	421,665	257,296	Nevada	63,400	81,425	122,225
Arkansas	109,550	349,988	91,032	New Hampshire	155,210	52,539	25,160
California	13,664,423	20,095,948	11,435,867	New Jersey	4,256,297	6,071,373	2,740,736
Colorado	842,179	919,000	600,131	New Mexico	78,871	267,175	620,084
Connecticut	2,677,998	4,418,155	3,444,936	New York	60,712,688	44,315,321	32,643,486
Delaware	555,620	1,885,558	394,968	North Carolina	478,272	1,177,678	605,502
District of Columbia	2,654,390	3,083,040	5,159,315	North Dakota	87,582	112,299	69,118
Florida	904,637	1,336,974	845,197	Ohio	6,253,746	15,930,965	6,030,998
Georgia	429,069	2,241,508	295,836	Oklahoma	1,496,158	2,865,917	2,767,728
Idaho	88,852	128,307	64,940	Oregon	809,734	1,989,898	880,392
Illinois	20,115,455	8,822,731	10,394,785	Pennsylvania	3,537,254	10,921,609	2,633,951
Indiana	1,553,779	2,313,864	1,768,339	Rhode Island	644,380	1,746,388	289,915
Iowa	1,026,263	1,344,313	719,197	South Carolina	442,738	617,393	114,235
Kansas	295,846	1,605,832	238,810	South Dakota	168,088	84,120	118,490
Kentucky	968,630	677,285	437,115	Tennessee	522,112	3,011,853	691,829
Louisiana	548,114	1,062,944	513,561	Texas	3,435,515	7,726,123	5,719,187
Maine	118,123	226,270	49,370	Utah	176,289	534,720	210,522
Maryland	2,584,454	2,661,472	2,871,291	Virginia	1,059,898	1,314,892	395,864
Massachusetts	4,019,813	7,921,417	3,435,108	Washington	1,780,435	3,591,422	1,459.150
Michigan	3,661,672	8,453,707	2,921,851	West Virginia	135,667	4,652,889	156,148
Minnesota	3,724,757	1,877,257	1,396,118	Wisconsin	2,402,555	3,592,796	1,901,054
Mississippi	31,745	38,348	22,908	Wyoming	23,535	37,934	19,430
Missouri	1,784,938	2,669,451	2,024,805				
Montana	422,450	294,105	275,855	Total	$153,874,079	$188,131,049	$111,153,636

Cement Company Wins Dust-Nuisance Trial

ACT OF NATURE, JUDGE SAYS

The British Columbia Cement Co. Ltd., operating a plant at Bamberton, B. C., has won a complete victory in the cement-dust nuisance case brought against the company by Malahat Park, Ltd , and the Sandy Beach Inn & Golf Links Ltd., owners of property running from the beach up a mountain near the cement plant on which they claimed they planned to build a resort hotel with golf links and fishing pools.

The case is of interest to the cement industry as a whole because of the judicial precedent it sets.

After a trial lasting over a week, during which the whole court was transported by sight-seeing cars to Bamberton and personal investigations conducted there, the jury brought in a verdict giving no damages to the resort companies.

The official judgment of the justice completes the unqualified victory of the cement company and the resort companies have been ordered to pay all costs.

The judge, in reading the verdict, stated that the Sandy Beach Inn & Golf Links Ltd. had no title to the property affected and its action was dismissed, leaving only the Malahat Park Ltd. as plaintiff.

This company conceived the idea of establishing a summer resort on its property about a mile from the cement mill, and subdivided a portion of it into small lots, roughly laid out some roads and offered the lots for sale to the public, the decree sets out. The scheme included the building of a hotel, construction of golf links and establishing fishing and riding recreations.

"But little was done towards effecting these purposes," the judge declared. "Only a few lots were sold and none of the purchasers joined in this action. The undertaking was a total failure and it brought this action contending that the failure was caused by the presence of cement dust and noxious fumes from the cement plant falling upon the land, making the property so undesirable that people would not purchase it and seriously injuring the trees and vegetation.

"The cement company defendants are carrying on a lawful business in a most suitable place, far distant from the plaintiff's land, and it is only when the wind blows towards the plaintiffs property that the smoke and dust from the defendant's stack is carried to the plaintiff's property. The injury, if any, is not direct, but consequential and occasional and brought about by nature's laws. There has been no entry upon the plaintiff's land.

"The jury's answers to the questions submitted to them negative any action for nuisance, for it has found that the plaintiff has suffered no damage and it will not be denied, I suppose, that no action will lie for a nuisance unless it is the cause of actual damage to the plaintiff. And the damage must be something more than merely nominal.

"Everything must be looked at from a reasonable point of view, therefore the law does not regard trifling and small inconvenience, but only regards sensible inconvenience, injuries, which sensibly diminish the comfort, enjoyment or value of the property which is affected.

"A similar case was fully considered and recognized as settling the law in cases of nuisance in Slavin vs. Brancepeth Coal Co. (1874), L.R. 9 Ch. App. 705, (a smoke-nuisance case) and it was there held that the damage must be substantial as distinguished from nominal. See also Umfreville vs. Johnson (1875) L.R. 10 Ch. App. 380, which like the present was a case of injury claimed to be a nuisance by cement works."

Erects Sand-and-Gravel Plant Near Bloomington

The Cast Stone Construction Co. of Bloomington, Ill., has purchased the Oedewaldt farm at Kingston Lake. and is starting to erect a $20,000 gravel washing and screening plant.

A drag-line scraper is now at work stripping and building a ramp with the waste material which will be used in loading gravel to barges. Negotiations are also being made for the right-of-way for a spur track to connect the plant with the T. P. & W. Ry.

Newaygo Cement Workmen Attend Annual Banquet

The fourteenth annual banquet of the employees of Newaygo Portland Cement Co. was held April 28th at Newaygo, Mich., with about 150 present. Dinner was served by the women's auxiliary of the company. The program was in the nature of a safety rally. Burr Horner, chairman of the safety committee, was toastmaster. Talks were given by W. N. Powell, safety director and W. L. White. assistant general manager, of the Medusa Portland Cement Co., both of Cleveland. Dancing followed the program.

Experimental Farms of Cement Co. Discontinued

The Alpha Portland Cement Co. has decided to discontinue the operation of its agricultural experiment farms near Bellevue, Mich., which it has operated in connection with its plant at Bellevue for several years. Farm tools and livestock are to be sold at auction.

The city council of Fargo, N. D., recently passed an ordinance which requires the sale of sand and crushed stone by weight.

Marble Chief Directs Exposition Exhibit

URGES INDUSTRY PARTICIPATE

Chicago's 1933 world's fair will afford industry and invested capital an unparalleled opportunity to tell the story of how they made possible the application of scientific discoveries to human progress, according to John Stephen Sewell, director of exhibits for the exposition, who is president of the Alabama Marble Co. of Birmingham, Ala.

Mr. Sewell spoke before the Association of National Advertisers at a recent meeting in the Palmer House, Chicago. "Without industry and invested capital, the great scientific discoveries would have remained mere matters of academic and philosophic interest, and they would have left the great mass of people entirely untouched," he declared.

"In this day, when large aggregations of invested capital are subject to attacks by radical elements among our politicians, it is highly important to convey to the people at large an appreciation and understanding of the great stake which they have in the continued integrity of the invested capital of the country.

"Under present conditions our laws make it impossible for business to regulate itself so as to stabilize economic conditions. Anything which may be called competition is sanctified by law and it is a felony to undertake to control it, notwithstanding the fact that every honest man knows that many so-called competitive methods are essentially immoral and dishonest and that they tend to dissipate the very means of subsistence of a majority of the population."

New Gravel-Plant Tipple Tested by Ohio Operator

The Portsmouth Sand & Gravel Co. of Portsmouth, O., recently made a test run of the new washing and screening machinery in its newly-constructed tipple at the plant, located at the Kentucky approach of the C. & O. bridge, across the Ohio River from Portsmouth. The new equipment operated quite satisfactorily, according to F. C. Fuller, president.

G. G. Peters is superintendent of operations. Most of the material produced by the company is used for construction work by the C. & O. railway.

Indiana Producer Buys Excavators and Trucks

The Hi-Rock Products Co., of Evansville, Ind., is making improvements at its Marengo, Ind., crushing plant, including gasoline-operated excavators and a fleet of motor trucks. Production is to be stepped up to 500 tons daily, according to A. H. Mann, secretary. Fifteen men will be employed.

Solid Carbon Dioxide Firm Denied Monopoly

COURT DECISION EXPLAINED

Lime-plant operators, who have deferred investigation and the possible adoption of methods for the by-product manufacture of carbon dioxide on account of their fear of patent infringement, will be interested in the decision rendered by Justice Louis J. Brandeis of the United States Supreme Court on March 9, 1931, in the case of the Carbice Corp. of America v. American Patents Development Corp., et al. This appeal was raised on a writ of certiorari to the Circuit Court of Appeals for the second circuit. He reversed the decision of the lower court. This decision denies the right of the owner of a patent to restrict unpatented adjuncts. The court holds that a licensor can not impose such conditions in licensing the use of a package employing solid carbon dioxide. Explanatory excerpts from Justice Brandeis' decision follow:

"The American Patents Development Corp., as owner of the United States Patent No. 1,595,426, and the DryIce Corp. as exclusive licensee, brought this suit in the Federal court for eastern New York to enjoin contributory infringement by the Carbice Co., for an accounting of profits, and for damages. The defendant denied both the validity of the patent and the alleged infringement. The district court, without passing upon validity, dismissed the bill on the ground that infringement had not been shown. The circuit court of appeals held the patent valid and infringed. A writ of certiorari was granted. . . .

"The patent in suit is not for solid carbon dioxide. That article and its properties as a refrigerant have been long known to the public. The patent is not for a machine for making solid carbon dioxide. Nor is it for a process for making or using that substance. The Patent Office rejected an application for a process patent. The patent is said to be for a manufacture. The specifications outline the method of construction and use; and a typical claim (6) is for a 'transportation package consisting of a protective casing of insulating material having packed therein a quantity of frozen carbon dioxide in an insulating container and a quantity of freezable product in freezing proximity to said frozen carbon dioxide and the gas evaporated therefrom, arranged so that said frozen carbon dioxide is less accessible for exterior heat than said freezable products.' . . . .

"The sole business of the DryIce Corp. is the manufacture of solid carbon dioxide, which it sells under the name of 'DryIce.' It does not make or sell transportation packages in which solid carbon dioxide is used as a refrigerant. It does not issue to other concerns licenses to make such packages upon payment of a stipulated royalty. . . .

"The Carbice Corp. also manufactures solid carbon dioxide. It is charged with contributory infringement because it sells its product to customers of the DryIce Corp. with knowledge that the dioxide is to be used by the purchaser in transportation packages like those described in the patent. The Carbice Corp. challenges the validity of the patent and denies infringement. Whether the transportation package described is a patentable invention we need not determine. For, even if it is, no relief can be granted. . . .

"The invention claimed is for a particular kind of package employing solid carbon dioxide in a new combination. If the patent is valid, the owner can, of course, prohibit entirely the manufacture, sale, or use of such packages; or it can grant licenses upon terms consistent with the limited scope of the patent monopoly. It may charge a royalty or license fee, but it may not exact as the condition of a license that unpatented materials used in connection with the invention shall be purchased only from the licensor; and if it does so, relief against one who supplies such unpatented materials will be denied. The limited monopoly to make, use, and vend an article may not be 'expanded by limitations as to materials and supplies necessary to the operation of it.' . . . .

"If a monopoly could be so expanded, the owner of a patent for a product might conceivably monopolize the commerce in a large part of unpatented materials used in its manufacture. The owner of a patent for a process might secure a partial monopoly on the unpatented materials used in it. The owner of the patent in suit might conceivably secure a limited monopoly for the supply not only of solid carbon dioxide, but also of the ice cream and other foods, as well as of the cartons in which they are shipped. The attempt to limit the license to the use of unpatented materials purchased from the licensor is comparable to the attempt of a patentee to fix the price at which the patented article may be resold.

"The DryIce Corp. has no right to be free from competition in the sale of solid carbon dioxide. Control over the supply of such unpatented material is beyond the scope of the patentee's monopoly; and this limitation, inherent in the patent grant, is not dependent upon the peculiar function or character of the unpatented material or on the way in which it is used. Relief is denied because the DryIce Corp. is attempting, without sanction of law, to employ the patent to secure a limited monopoly of unpatented material used in applying the invention. The present attempt is analogous to the use of a patent as an instrument for restraining commerce which was condemned, under the Sherman anti-trust law."

Industrial Standards Approval Announced

YEAR BOOK LISTS PROJECTS

The approval of 46 new national industrial standards including many important projects in the field of mechanical, electrical, civil, mining, and chemical engineering, is announced in the American Standards Year Book for 1931 which has just been published by the American Standards Assn. The book states that 178 uncompleted projects are under way. More than 2,200 individuals, representing 400 national organizations, are represented on the ASA technical committees in charge of these projects.

The Association reports coöperation with the national standardizing bodies of twenty other countries under the auspices of the International Standards Assn., of which the ASA is a member. The Year Book reports that the standards approved by the foreign bodies have been widely distributed in this country, particularly among companies interested in export trade.

During the past year, the ASA Information Service has had 1,200 requests for information on standards and specifications from industrial companies and organizations throughout the United States. Eighteen thousand copies of American Standards have been sold by the Information Service.

Among the standards that have been approved are the following:

A1-1928. Specifications for Portland cement. Although approved, this project is under revision.

A5-1930. Method for Test of Toughness of Rock.

A26-1930. Methods of Sampling Stone, Slag, Gravel, Sand and Stone Block, for Use as Highways Materials.

A27-1924. Method of Test for Apparent Specific Gravity of Coarse Aggregates.

A31-1924. Specifications for Cement Grout Filler for Brick and Stone Block Pavements.

A44. Method of Test for Organic Impurities in Sand for Concrete.

A45. Method of Test for Sieve Analysis of Aggregates for Concrete.

Topeka Operator Erects New Plant on Kaw River

The Victory Sand Co. of Topeka, Kan., has begun the installation of a new sand plant on the Kaw River, dredging material from the bed of the river. Spur tracks are being laid to the new plant and production is expected to start early in the summer.

Warner Starts Erection of New Concrete Plant

The Warner Co. has begun the erection of a new central-concrete-mixing plant near its sand and gravel deposits at Morrisville, Pa. The new operation will cost over $50,000 with equipment.

Editorials

Keep Wages Up

RELIEF from the evils of "poor" business is not to be found by reducing wage scales, although a few producers are trying by this method to check the decline in their earnings and dividend payments. As a business policy, wage-cutting is no more defensible than price-cutting. Both are wasteful and dangerous expedients, and neither one accomplishes anything more than temporary relief. Wage-cutting appears at first glance to be justified by the theory that, because the earning power of capital has been impaired, that of the worker should be similarly impaired and that, because of a lower cost of living, labor will suffer no injustice from it. But this is to take a very short view of the problem.

The great prosperity which America has enjoyed, and which has brought to this country living standards far higher than those in vogue elsewhere, has been the result of the high wages paid to American labor. These wages have risen for more than seventy years and prosperity, in spite of occasional and temporary setbacks, has kept pace. To reduce wages in the hope of rectifying present ills is to close one's eyes to the facts of our economic history; it threatens the economic stability of the country by reducing the buying power of labor; it promises, if widely followed, to return us to the living and prosperity standards of Civil-War days. Buying power is naturally at a low point under present conditions of unemployment; wise employers will not drive it lower by reducing wages.

Thousands of families have fewer and smaller sources of income than in times of prosperity; those fully employed must support the unemployed and the partly employed. Under such circumstances buying power must remain low until incomes can be increased through higher wages or until they can be multiplied through more widespread employment. Lower wages may relieve capital of some of its burdens for a time, but they can not restore the economic health of the country.

There is, of course, the further danger that reductions intended to be temporary may become permanent. It is easier to reduce wages than to increase them, because it is wrongfully believed, particularly in times of economic stress, that the only way to increase profits is to decrease costs. It is very difficult, as the history of the relations between capital and labor shows, to restore old and higher wage scales, for reductions once established tend to perpetuate themselves. For this reason wage-cutting has a more serious effect on buying power than is generally supposed; its results persist long after the cause has been removed. A reduction in wages causes an immediate reduction in buying power; but a restoration of former scales is not immediately followed by a renewal of buying power, because savings have been consumed and must be rebuilt, confidence has been destroyed and must be recreated, and neither is done in a day.

Aside from all these practical considerations, which touch the pocketbook of the employer and, therefore, deserve first consideration, there is the question of ethics, which points in the same direction. It is not fair—and this is a reason that will appeal to all men with any sense of justice—to penalize labor for the existence of conditions for which it is not responsible. The causes of business depressions are in the hands of business men, and business management must take the responsibility for, and bear the burden of, business losses, just as it claims the credit for, and appropriates the benefits of, business gains. And, fortunately, what thus appears to be a plea for altruism is also a plea for common sense, for, if the gains of prosperous business are not distributed among the multitude, it is difficult to understand how the surplus gains of the few are to be profitably invested. The minority having large individual buying power depends for its existence on the majority having small individual buying power, and, if the purchasing ability of the latter is to be impaired through wage reductions, we may well wonder how the prosperity of the minority is to be sustained. Herein lies the economic justification of the statement that high wages make large buying power and industrial and national prosperity.

Industry Progresses Through the Exchange of Ideas

ALTHOUGH there are times when we all are inclined to think that our industries have not reached the same state of efficiency as characterizes other lines of business, there can be no doubt that our producers have made great strides toward the efficiency goal in recent years. One has only to remember, for example, the "modern" crushed-stone or sand-and-gravel plant of twenty years ago to realize the advances that have been made beyond what we would now call the makeshift methods and equipment of those days.

Most of this progress may safely be attributed to the readiness with which producers have been willing to exchange ideas among themselves, not only through the medium of their local and national associations, but also—and, indeed, principally—through the industry's trade journalism. Articles on plant operations, describing in detail the processes and equipment employed in the most advanced types of plants, have probably done more than any other single factor to stimulate the desire for greater efficiency and to bring about the great changes in methods and machinery that have marked the last two decades.

The producer who admits into his plant a trade-paper editor, whose mission is that of investigating and reporting everything he sees, makes a note-

worthy contribution to the progress of his industry. In making the results of his own experience available for the purpose of helping his fellow-producers he displays more than a laudable unselfishness. He shows a firm belief in the value of an exchange of ideas; he realizes fully that no one has a monopoly of knowledge, that the secret of to-day is the gossip of to-morrow, that we learn as we discuss, and that we profit as we share what we learn.

Every year the editorial representatives of PIT AND QUARRY are admitted to hundreds of producing plants—the average has been more than a thousand plants a year for the last several years—and everything they seek to know is shown to them, often for their own information only, but more often for the benefit of other producers through the columns of the paper. Wherever they go they meet a hunger for knowledge of the most advanced methods and a willingness to contribute the results of their own improvements for the advancement of the industry as a whole.

This spirit deserves great praise, for it discloses a sense of obligation to all those who have like interests and a farsightedness that can see the greater benefits which must ultimately accrue from a willingness to give as well as take. It recognizes the debt of each one to the group, and the fact that group knowledge is group property, contributed to by all and to be shared by all.

Gasoline Taxes for Roads

THE way in which gasoline taxes, collected for the building and improvement of highways, have been, and are being, diverted to other uses should be a matter of concern to the industry supplying road-building materials. Highway construction and betterment absorb a very large portion of the country's total output of construction materials and, on that account, non-metallic-mineral producers can not afford to be unmindful of the sources and disbursement of those public revenues on which the industry so largely depends.

Politicians are ever greedy for greater revenues, not alone because public expenditures offer numerous opportunities for the diversion of public money to private gain, but also because large revenues allow large expenditures and the hordes of job-holders who attach themselves to every financially sound political unit. There should be small cause for wonderment, then, if gasoline taxes have been seized upon as a ready and seemingly inexhaustible source of revenue for many uses other than the building and improvement of roads, which is the purpose of such taxes and about the only basis on which their levying can be defended. And as long as motor-vehicle owners, road builders, and those who furnish the materials for highway construction appear to be content—as evidenced by their failure to protest—with the continued and increasing diversion of such taxes to expenditures for which they were not intended, we may expect to see our public servants become more and more daring in the misappropriation of funds which were created for and belong to highway users.

"Gasoline-tax collections for the United States in 1930 reached the staggering total of $522,110,961," says Edward G. Seubert, president of the Standard Oil Co. of Indiana in his annual report to stockholders. "While there may be justification for a moderate tax on gasoline for road-building purposes," he continues, "taxing bodies apparently have singled it out as the medium through which they may indulge in new extravagances for an increasing variety of purposes. The time has arrived when the industry, its stockholders and patrons should unite to check the increase of the tax burden on petroleum and its products. . . . High gasoline-tax rates will eventually seriously affect consumption."

In our opinion, the gasoline-tax method of apportioning the cost of highway building and improvement approximately in proportion to the way in which the benefits of good roads are enjoyed is probably as good a plan as has ever been suggested. Like all taxing methods, it is open to the objection that it is not fair to all users of the highways, inasmuch as it fails to differentiate between private and commercial users of the roads and between those who cause little wear and those who cause greater wear of highway surfaces. And like all other taxes, the revenues it produces will be diverted to other purposes and will be wasted through inefficient expenditure. While we may tolerate the relatively unimportant inequalities that result from the application of the gasoline levy, chiefly because no one has suggested any more accurate or equitable means of placing the burden, we should not condone the misapplication of the funds which it produces. The amount of money made available through gasoline taxes is none too great for the stupendous task of providing new roads and improvements that are badly needed, and the task before the road-building agencies of the country will need every dollar that such taxes collect.

Mr. Seubert's anxiety is a natural one, but we think he takes an unnecessarily narrow view of the question. Gasoline taxes have not, as far as any one can show, had a diminishing effect on highway traffic, and it is reasonable to assume that the use of the highways will increase almost directly as the number of motor vehicles in use. The ratio of highway travel to motor-vehicle ownership is, in fact, bound to increase with the increase in highway facilities and, as traffic increases, so will the use of fuel increase. We believe that gasoline taxes might be increased beyond their present levels without tending to restrict highway use to an appreciable degree, and we believe that higher gasoline taxes are bound to come. We can see no reasonable objection to such a prospect as long as our need for highways is so far above our highway facilities, and as long as the revenues derived from that source are applied exclusively to the purposes for which such taxes are levied. The great danger, it seems to us, lies in the growing tendency to divert these taxes to uses that have no relation to highway development, and it is to this danger that our industry should turn its attention.

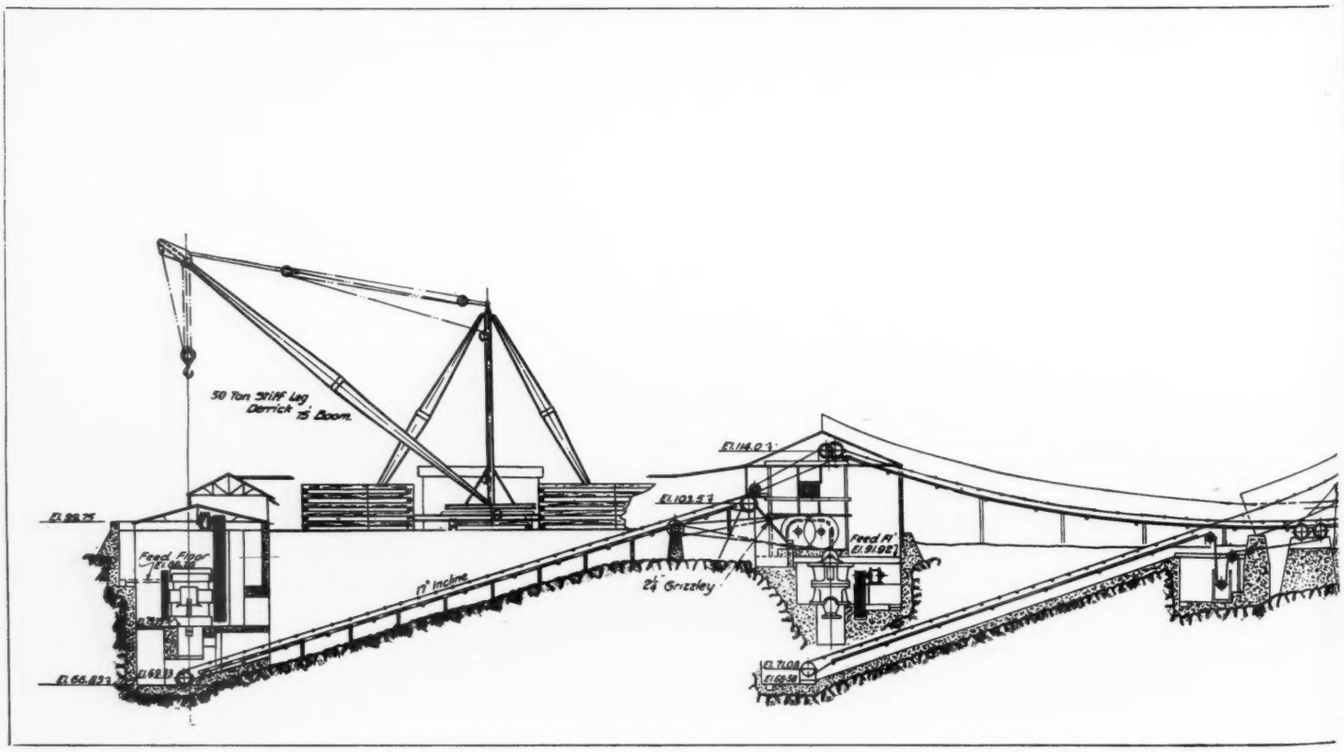
Producing Aggregates and Concrete for the Beauharnois Power Project

A general view of the entire plant with the crusher building at right. At the left the cement-storage bins are visible behind the screening and mixing building.

Crushed-Stone Screening and Concrete Mixing Accomplished in Single Building

THE problem of securing an adequate and suitable supply of aggregate for large construction jobs, especially when the jobs are far from any regular source of supply, is always a serious one. This is especially true of dams for power-development projects because of the large quantities of aggregate required. In other cases, the project is just far enough from a source of supply for the freight rates to make costs almost prohibitive. In most such cases there is no alternative for the contractor but to build his own plant.

The Beauharnois Construction Co. was confronted with this problem when work was started on the power canal and dam at Beauharnois, Que., Can., about 35 miles southwest of Montreal on the St. Lawrence River. This project of the Beauharnois Power Corp., of which the contracting company is a subsidiary, involves the construction of an intake canal 15½ miles long, starting at Lake St. Francis and extending to a point on Lake St. Louis near the town of Beauharnois where the dam and power-house are located. The entire project is so laid out that, eventually, it can afford the necessary canalization of the so-called "Soulanges Section" of the St. Lawrence River for the greater width and draft of the proposed new waterway. A discus-



A cross-section showing the primary and secondary crushers

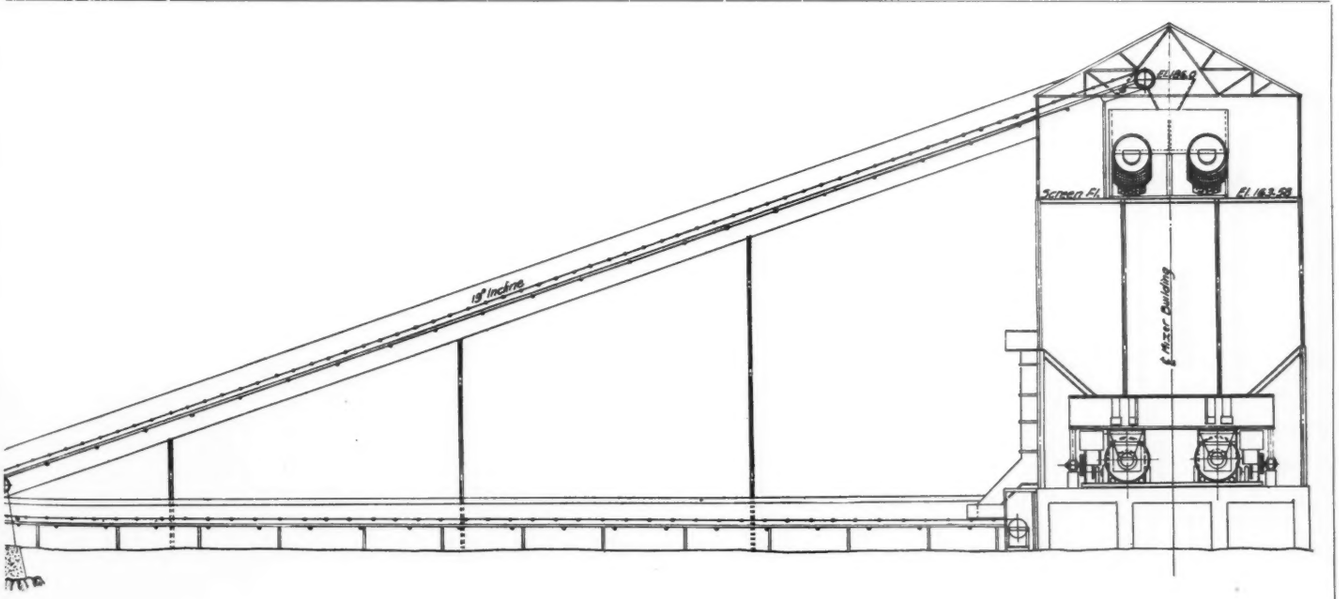
Looking from the dam-site toward Lake St. Louis. Large electric shovel excavating stone for tail race in foreground.

sion of the problems encountered in designing and building a stone-crushing and central concrete-mixing plant for this project and in securing raw material follows, together with a description of the plant.

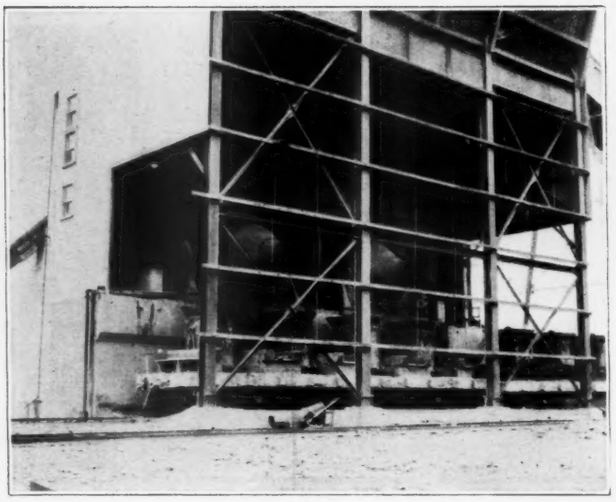
The total amount of rock excavation necessary for the dam and power-house sites and for the tail-race is about 1,250,000 cu. yd. The total amount of concrete required is about 380,000 cu. yd., most of which is in the bulkhead and power-house foundations and the necessary retaining walls. As the stone consists of good quality limestone and sandstone, both suitable for aggregate purposes, the obvious thing to do was to utilize some of this rock, which would otherwise have been wasted, for the concrete.

The next thing to be done was to design a plant of ample capacity to produce both fine and coarse aggregate at a lower cost than they could be purchased from an outside source. As the plant is to be operated only for the limited time required to complete this job it was important to build the plant as economically as possible without sacrificing the quality of the aggregates produced.

It was decided that a 48-in. by 60-in. jaw crusher as a breaker with a 20-in. gyratory to finish the material, giving an approximate output of 2,000 cu. yd. per ten hours, would adequately provide the necessary requirement of crushed stone. In fact, the jaw crusher has a manufacturer's rating of 2,000 cu. yd. per ten hours, and the gyratory 1,300



at left with screening, storage and mixing plant at right.



A close-up view showing the dump buckets on flat cars ready to receive concrete from the mixers.

cu. yd. per ten hours. The shovel for the excavation was to be an 8-cu. yd. machine with a vertical loading reach of 60 ft. from the bottom of the cut to the grade of the loading track. Twenty-cu. yd.-capacity side-dump cars were to be used for transportation. This equipment was determined by other considerations than that part of the rock was to go to the crushers. The size of the breaker is somewhat small for equipment of this type, but it was highly desirable that a large and powerful shovel be used for the excavation, that large cars be used for the long hauls on other disposals which were to be carried on simultaneously, and that the cars be able to rotate from one service to the other. It was thought that, by the exercise of care in excluding the largest stone when loading for the crusher and in loading the cars to a little less than capacity, little or no trouble would be experienced. Later operation has confirmed this assumption.

Since the points of origin of the rock and points of delivery of the concrete, insofar as train haul was concerned, were at approximately the same level, it was deemed desirable and economical, other consid-

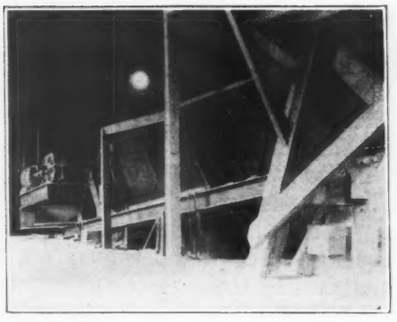
A view showing the dam under construction with shovel excavating tail race in foreground.

erations permitting, to locate points of delivery of rock to the crushers and origin of concrete from the mixers at as nearly this same level as possible. The net result of accomplishing these locations at or near the same level would be the elimination of grades (as far as possible) for locomotive hauls, and handling, between different elevations and between different points in the several operations of crush-

An airplane view showing crushed stone and concrete plant at right with office and commissary buildings at left. The excavation for the dam tail race, from which the stone for these plants is being taken, is shown in the upper left-hand corner. The St. Lawrence River, called Lake St. Louis at this point, is visible in the upper right-hand corner.

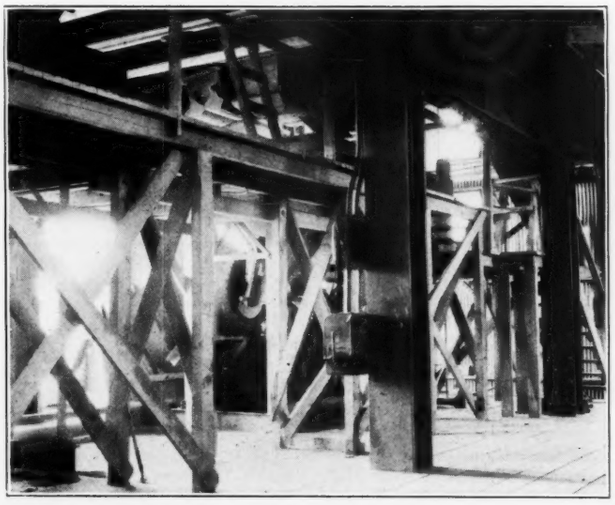
The grizzly feed to the gyratory secondary crusher.

A close-up view of the fine-reduction crushing rolls.



One of the revolving screens with its speed-reducer drive.

ing, screening and mixing, by the more efficient belt conveyor and gravity. It was deemed desirable to lay out the plant so that, in the case of a breakdown at the jaw crusher, cars might temporarily be dumped into the gyratory direct. This would mean the breaking into and loading of smaller rock during the interruption. From the bottom of the crushers to the track grade at the dumping hopper of both the crushers, the vertical distance is slightly more than 30 ft. This difference, insofar as railway haul was concerned, must be overcome by either a hill-side location with direct rise of the railway tracks by trestle or fill or the depression of the crushers.



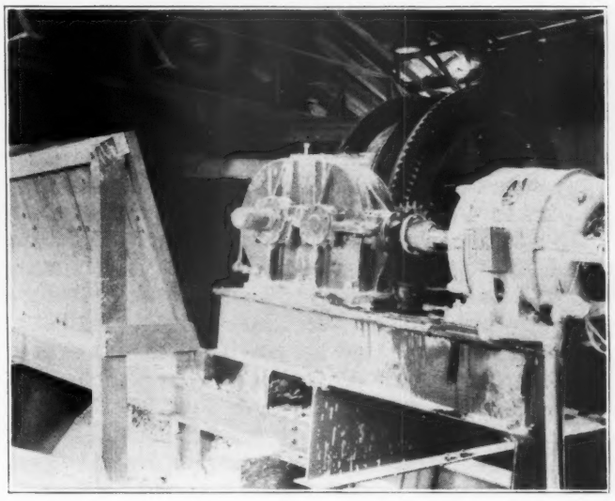
An interior view of the mixer building. Note the heavy steel columns and beams supporting the storage bins.

Topography and available space would not permit the grade eliminations otherwise, so it was decided to excavate into the solid rock which exists at the surface for the crushers and conveyors, to a depth that would enable making the grade elevation of the track at the dumping hoppers practically the surface of the ground. This determination eliminated railway grades as a factor in controlling the location of the plant. A suitable location as near the common point of excavation and final deposit of concrete as possible, but sufficiently far from the blasting operations for safety, was most desirable. The first requirement was fixed by the topography and an important highway, and the latter as one thousand feet approximately.

Complete layouts and estimates were made of the only alternative available—building the crushing plant above-ground, with the necessary railway approaches climbing through the vertical height required. Under this scheme, a very considerable amount of trestle and other timber work would have been required whereas, with the accepted layout, none of the tracks is above the surface. The housing is largely of corrugated-metal siding with the minimum of timber framing. The mixer building is of steel frame. The estimates proved the economy of the layout selected, both as to initial and operating cost. It also offered more nearly permanent construction and a lower fire hazard.

Good bank-sand is not available in the vicinity of the Beauharnois work nor did investigation disclose a considerable quantity of acceptable sand in the river nearby. The rock to be excavated is a highly silicious sandstone, and it was considered practical to manufacture the sand from the rock. With this in view, one set of 54-in. by 20-in. sand rolls was installed at the gyratory or secondary crusher.

One of the considerations in the layout of the cement storage was, although rail shipments were contemplated, to keep it within reach of water transportation, so that the alternative would always be available. Other than that the two controlling factors were the combination of economy of initial and operating costs. The entire plant is being operated twenty-four hours per day.



A close-up view of the speed-reducer drive of one of the two revolving sizing screens.

At the plant, a 50-ton capacity stiff-leg derrick with a 75-ft. boom dumps the cars to the Traylor Bulldog 48-in. by 60-in. jaw primary crusher. This derrick is so located that it can also dump cars into the secondary crusher when desired. The jaw crusher discharges its product to a 42-in. inclined belt conveyor to the secondary crushing plant. Here it passes over a rail grizzly with 2¼-in. spacing into the Traylor 20-in. gyratory secondary crusher. The product of this crusher, and the material passing through the grizzly, drop to a 30-in. inclined belt conveyor which carries the stone to the top of the mixing and screening building.

The primary crusher is belt-driven by a Canadian Westinghouse 150-hp. motor and the secondary crusher by a 100-hp. motor of the same make. Each conveyor is driven by a 50-hp. motor through a Hamilton Gear & Machine Co. speed reducer. The conveyor to the screening plant has a gravity take-up and is driven through tandem pulleys at the point where the conveyor leaves the ground level—about one-third the distance up the incline. Dodge

A carload of stone from the quarry being dumped to the primary crusher.

Mfg. Co. tail pulleys and take-ups, Rex Stearns idlers, and Gutta Percha Rubber Co. conveyor belting are used.

The conveyor discharges to a split chute feeding to two Traylor 60-in. by 20-ft. heavy-duty revolving screens. These have 1¼-in. and 4-in. perforations and a sand jacket with ⅜-in. perforations. Material below ⅜-in. in size goes to a sand bin with a capacity of 710 cu. yd. The ⅜-in. to 1¼-in. and the 1¼-in. to 4-in. rock go to a two-compartment bin with a total capacity of 1,960 cu. yd. When desired, the ⅜-in. to 1¼-in. material can be chuted to a 20-in. horizontal belt conveyor which takes it to a crushing roll in the secondary crusher building. The oversize stone rejected by the screens is chuted to a No. 4 gyratory reduction crusher which feeds to the same 20-in. belt conveyor.

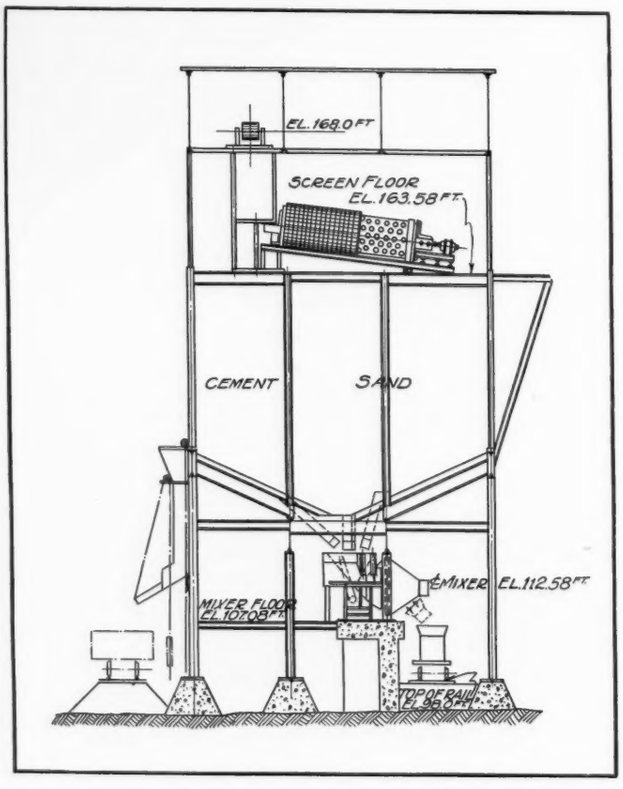
This conveyor is at ground level and is inclined, at its discharge end, where it discharges over a 1¼-in. rail grizzly into the Traylor 54-in. by 20-in. heavy-duty crushing rolls. The grizzly rejects and the products of the rolls go back to the main conveyor to the screening plant as stone over 1¼-in. and sand. Each revolving screen is driven by a 25-hp. motor through a Falk speed reducer. The conveyor is gear-driven by a 25-hp. motor and the crushing roll is belt-driven by a 75-hp. motor. This conveyor was furnished by the Plessisville Foundry Co. and has Gutta Percha belting.

Cement is stored in two octagonal laminated-timber bins across the tracks from the mixing and screening building. These are 17 ft. 6 in. in diam. by 40 ft. high and have a combined capacity of 5,300 bbl. of cement which is adequate because of the proximity of the source of supply. Cement is received in bulk and is unloaded by hand into three hoppers along the track. These are spaced one car-length apart and are at car-door height. They deliver to a Jeffrey 12-in. screw conveyor 118 ft. long parallel to the track which, in turn, delivers the cement to a Fuller-Kinyon 6-in. pump. This pump is arranged so that it can put the cement into silo storage or take it, from either the cars or the silos, into a 308-cu. yd.-capacity bin over the mixers. The pump is driven by a 50-hp. motor, and the screw conveyor by a 25-hp. motor through a Cleveland worm-gear speed reducer.

Aggregates and cement are fed through gates from the bins to two T. L. Smith Type 565 tilting mixers equipped with a Smith Weigh-Mix attachment, and a Fairbanks dial scale. Each mixer is driven by a 40-hp. motor.

To take care of such heating as may be necessary, a 100-hp. locomotive-type boiler is provided for furnishing steam to the water. No other heating is

(Continued on page 44)



Cross-section of the screening, storage and concrete-mixing building.

North African Lime Plant Designed to Cope with Vagaries of Climate*

Kilns in New Operation Built to Resist Disturbances Caused by Violent Winds

By J. BOERO

THE limestone deposits of the Bou-Kornine at Hammam-Lif, near Tunis, have been known for a long time, and the limes of this region enjoy the confidence of the Tunisian builders. A thorough study of the quarries known as the "Sabre Blow," made in 1928 by the author, showed that the limestone benches of this quarry were capable of yielding an eminently hydraulic lime of excellent quality. With the coöperation of a banking group of northern France, it was decided to establish a plant with a daily capacity of 100 tons, equipped with the most modern improvements.

Work was begun in February, 1929, and the kilns were fired in June, 1930. The location chosen was the valley known as the Sabre Blow, about 600 meters from the Hammam-Lif station and 17 kilometers from Tunis by the magnificent road from Tunis to Sousse. The Sabre Blow quarry is opened in the mountainside and will be developed for several hundred meters, the face of the cut advancing toward the west. The average analysis of the strata of the deposit in per cents, is as follows:

Total silica	14.60
Alumina	1.25
Iron oxide	1.15
Lime	44.75
Magnesia	2.05
Loss on ignition	36.10
Insoluble	0.10
	100.00

This is the composition of a limestone for eminently hydraulic lime. The limestone is hard, dense and shading in color from clear gray to reddish gray. The moisture of the quarry is almost nil.

The stone is shot down in large quantities, to effect a good mixture of the strata, by means of a compressor, hammer drills, and explosives. It is then broken down by sledge-hammers to suitable size, loaded into cars, and sent to the kilns. The latter are connected with the quarry by a metal trestle of about 30 meters.

The kilns are 4.5 meters in diameter and approximately 18 meters high to the platform. The height of the kiln proper above the grates is about 13 meters. They are of the simplest possible system, their value lying in the perfect study made of their proportions. Each kiln is provided with a stack of 1.4-meter diam. At the base of the kiln are four openings for drawing, each provided with a vertical grill serving to aerate the kiln and a horizontal grate serving for the draw. By means of these four horizontal grates, therefore, the operator is enabled at any time to correct the level of the fire if, for any reason, it happens to slope.

The idea of an entirely automatic kiln was rejected. In fact, it is the opinion of the author that a lime kiln needs, during the drawing, human intervention to prevent the mishaps which can arise even in the best-operated kilns. All ingenuity has thus consisted in making the hand drawing the simplest possible. Indeed, a single workman suffices for the drawing of the two kilns and is occupied also with the supervision of the torpedo conveyor and the fuel elevator.

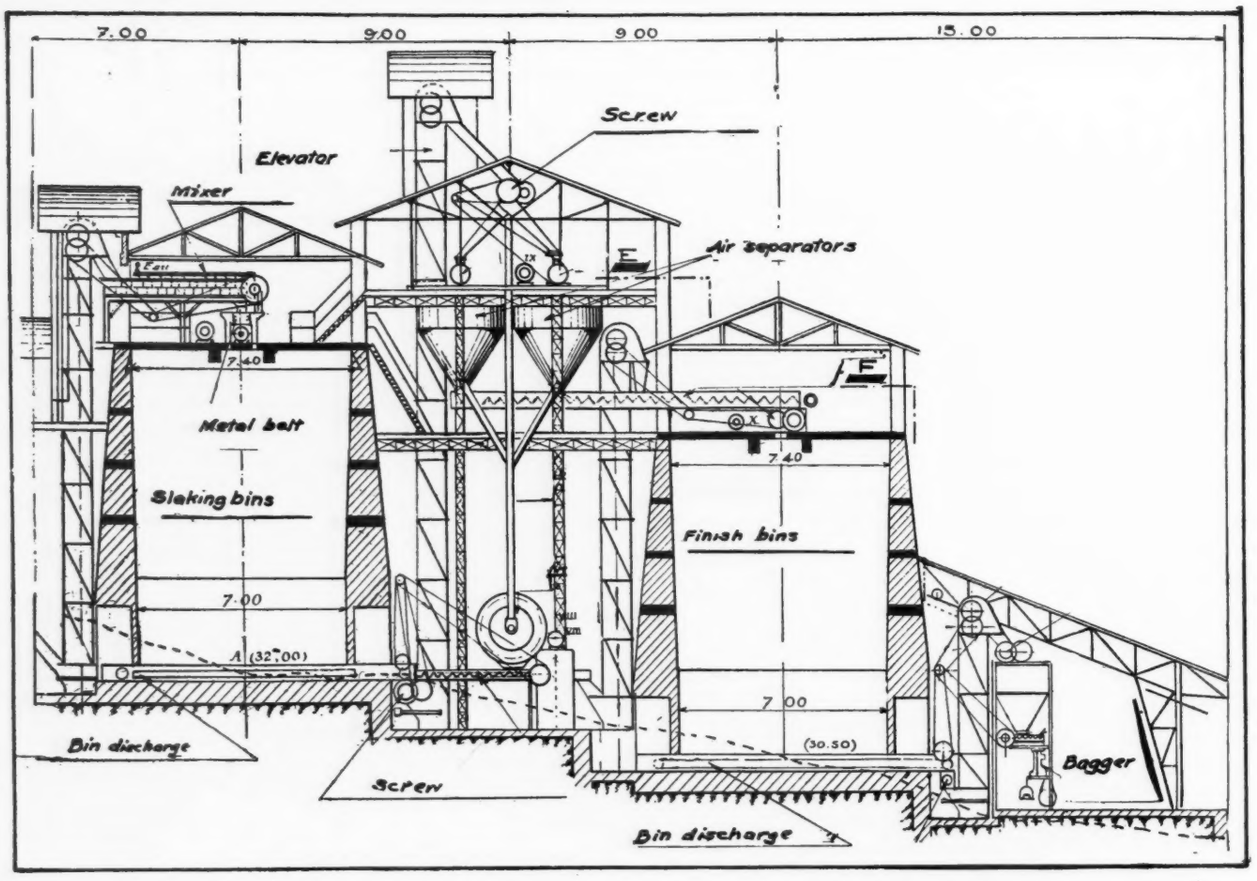
As the violent winds which prevail in this region could cause disturbances in the operation of the kiln, the tunnels giving access to the drawing openings are provided with doors mounted on rollers making it possible to obtain a regular draft on all faces of the kiln.

The kilns are of the mixed-feed type, for horizontal layers of limestone and of anthracite fines. Each kiln has a capacity of 50 tons of lime per day. The operations of loading and drawing are spaced at 11 hours. The capacity could be pushed to 60 and even 70 tons in case of need. The fuel consumption is 95 to 100 kilos per ton of lime drawn, varying with the benches from which the limestone is obtained. This fuel is reclaimed from the storage at the foot of the kilns and elevated to the platform by a small elevator. One man is sufficient for drawing, and two for charging.

Lime falling from the drawing grates accumulates in a hopper under each kiln, between the four foundation piers of the kiln. This hopper has a capacity of about 6 cu. m. From this hopper the lime is taken by a torpedo conveyor serving as an automatic drawing device and as an automatic feeder for a No. 2 Cleo crusher, wherein the lime is reduced to small pieces. This crusher is equipped with grills having perforations of 5-cm. diameter. Leaving the crusher, the lime is lifted by an elevator and discharged to a mixer which is provided with a ramp where water is added for slaking. This mixer is placed directly over the slaking bins and, from the mixer, the lime falls to a chain conveyor which discharges it to the two bins.

The latter are formed by two masonry chambers, reinforced by a series of girdles of reinforced concrete. Each chamber is provided with two openings at the top, serving for entrance and for the evacuation of the vapors formed in hydration. Each of the bins has a capacity of about 500 cu. m. In these bins the lime, during its hydration, is not subjected

*Translated from *Revue des Materiaux de Construction*, No. 254, pp. 425-429, Nov., 1930.



Section of slaking bins, crushing, separating and storage units at North African lime plant.

to any cooling from the atmosphere. It is thus slaked, so to speak, in a closed vessel, so that the temperature in the bins is kept high and the slaking is perfect.

After resting several days in the slaking bins the lime is reclaimed by scrapers which carry it to a chain conveyor, from which it falls into the hopper of an elevator. This distributes it to two air separators of 3-meter diam. The light lime obtained directly by these separators falls into a screw conveyor which takes it to one of two finished-product bins. The construction of these bins is almost identical with that of the slaking bins, except that the reinforced concrete girdles are not so important.

Rejects of the separators fall to a two-compartment tube-mill, 6 meters long and 1.3 meters in diameter. The product of this tube is received by an elevator and lifted to the same screw which receives the lime obtained directly from the separators. This screw serves simultaneously as conveyor and mixer.

From the finish bins the lime is reclaimed by scrapers similar to those of the slaking bins, and falls to a screw conveyor which carries it to a bagging station situated in the storage room of the plant and composed of a small elevator and two double weighing-baggers of the Chapuis system, which can sack up to 400 bags an hour. A loading dock, extending around three sides of the room, makes possible the economical loading of the sacks onto automotive trucks for delivery.

In this plant, one of the principal objectives was to arrange the units of equipment so that they are accessible at all points and that their supervision might be easier. It is to be noted that the plant has been put into practice almost like a theoretical plant. All the material-handling machines are enclosed; in consequence, the loose dust is reduced to a minimum. For another thing, as much as possible, the author standardized the handling equipment and the electric motors, reducing to a minimum the stock of replacement parts. Finally, the labor question is also reduced to a minimum. In fact, after the lime is drawn into the hoppers under the kilns, all the handling is mechanical up to the sacking.

The question of water, always of prime importance in a lime plant, has been solved by the boring of a large well, which furnishes amply the quantity necessary, and from which the water is pumped and distributed to a series of basins making it possible always to have large water reserves throughout the plant.

Power is furnished by two Diesel engines, one a 150-hp. vertical machine, the other a 55-hp. horizontal. These engines were furnished by the Deutz company of Cologne. The electric power is furnished by two Breguet alternators, driven by the Diesels. The different machines, such as the separators and conveyors, are driven individually or in groups by electric motors of the Boucherot system.

Bronze Bearings Versus Roller Bearings as Applied to Jaw Crushers

By W. GUY FRAZEE
Vice-President, Iowa Manufacturing Co.

SO many erroneous statements have been made and published as to the saving in power and increase in capacity accomplished by the use of anti-friction bearings in jaw crushers, that our company, as manufacturers of crushers of that type, conducted an official test on February 4, 1931, in our factory at Cedar Rapids, Ia., to determine accurately just what this horsepower saving and increased capacity really were. We believe we were the first manufacturers to conduct experiments, to gather data, and to develop anti-friction bearings in rock crushers, having begun this development work some five years ago. All in all, the information we have gathered during these years positively disproves the theory of any great saving.

On February 4, 1931, after proper preparation, the test was conducted under the direction and supervision of the Patzig Testing Laboratories, of Des Moines, Ia. On account of the voluminous extent of the official report and the lack of space which can be devoted to this article, I shall attempt to quote only from such paragraphs of that report as have a direct bearing on the question and shall eliminate a great many of the technical paragraphs.

"The crushers used in making these tests," says the report, "were two Cedar Rapids crushers, made by the Iowa Mfg. Co., Cedar Rapids, Ia. Both crushers, their No. 336, were of the same size and design, except that one was equipped with centrifugally-cast phosphor-bronze bearings while the other was equipped with . . . roller bearings. Both crushers were of the size having a 3-in. by 36-in. opening, and jaws were set by gauge ½ in. apart at the bottom, with the eccentric in the upper vertical position, before tests were made. The crusher fitted with bronze bearings was equipped with thermometers for indicating the oil temperatures at the bearings.

"An overhead steel hopper, holding about 20 tons of limestone of the size and quality shown in Table

Table I—SIZE AND HARDNESS OF RAW PRODUCT

Passing ¾-inch round, retained on ¼-inch square	1.9%
Passing 1½-inch round, retained on ¾-inch round	44.3
Passing 3-inch round, retained on 1½-inch round	53.8
Total	100.0%
French co-efficient of wear	10.2

I, was erected over a pit, in which was placed the lower end of a portable belt conveyor. The crusher to be tested was set on a timber foundation over this pit and directly under the overhead-hopper discharge. A small hopper was placed in a position to receive the rock from the overhead-hopper discharge and direct its flow evenly between the crusher jaws. The discharge from the crushers was fed directly to the belt conveyor, which discharged the material into waiting trucks. As soon as filled, these trucks were driven to the city scales to be weighed.

"The first run was made with the bronze-bearing crusher and, after this test was completed, the crusher was loosened from its foundation and removed by crane. The roller-bearing crusher was then set in place exactly in the same manner and location as the first crusher.

Table II—TEST RESULTS WHILE MOTOR AND CRUSHER RAN IDLING

	Test 1: Bronze-Bearing Crusher	Test 2: Roller-Bearing Crusher
Speed of crusher, *r.p.m.*	425	425
Temperature, left bearing, *deg. F.*	115	*
Temperature, right bearing, *deg. F.*	100	*
Indicated horsepower	10.1	9.1

*No temperature readings were obtainable on the roller-bearing crusher since there were no oil wells in which the thermometers could be placed.
(Note: There was a difference of only 1 hp. between the power required for idling.)

"Each crusher when in place was run by belt from a 50-hp. Century double squirrel-cage, 2-phase, high-torque, 2-voltage (220 or 440 v.), 860-r.p.m. motor, amperes per L 134-67, Serial No. 962,596. The motor was connected to the power circuit through a 4-wire, 2-phase circuit, leading direct to the motor without any interfering power loads.

Table III—TEST RESULTS SECURED WHILE CRUSHING

	Test 1: Bronze-Bearing Crusher	Test 2: Roller-Bearing Crusher
Speed of crusher, *r.p.m.*	420	420 to 422
Temperature, left bearing, *deg. F.*	116 to 116	*
Temperature, right bearing, *deg. F.*	100 to 100	*
Duration of crushing, *min.*	14½	18½
Amount of rock crushed, *lb.*	15,225	20,047
Rock crushed per hour, *tons*	31.5	32.49
Indicated horsepower	49.65	42.68

*No temperature readings were obtainable on the roller-bearing crusher since there were no oil wells in which the thermometer could be placed.

"In this circuit, between the power switch and the motor, were connected the various instruments used to ascertain the electric-power consumption. For this purpose the following instruments were used.

1 Jewell voltmeter, 110/220, pattern 174.
1 Weston indicating ammeter, Model 370.
1 Weston polyphase indicating wattmeter, Model 329.
1 G. E. polyphase recording wattmeter, Type C.P. 5.
2 Esterline Angus portable current transformers."

It will be noted that there is practically no difference in the capacity of the two crushers, but there is a saving of 14 per cent. in horsepower in favor of the roller-bearing crusher. However, ana-

Table IV—SIZE OF FINISHED PRODUCT

	Test 1: Bronze-Bearing Crusher	Test 2: Roller-Bearing Crusher
Passing ¼-inch square opening	42.2%	36.5%
Passing ½-inch round, retained on ¼-inch square	20.0	19.1
Passing ¾-inch round, retained on ½-inch round	27.0	27.0
Retained on ¾-inch round	10.8	17.4
	100.0%	100.0%

lyzing the finished product, it will be noted that the bronze-bearing crusher delivered 5.7 per cent. more material passing ¼-in. square opening and 5.6 per cent. less material retained on ¾-in. round perforation. This indicates that the bronze-bearing crusher was delivering a finer crushed material, which would absolutely account for a big percentage of this same saving in horsepower. This is due to the fact that after the jaws were set to ½-in. gauge and the crusher put under load, the adjusting wedges seated themselves more on one crusher than on the other, so that, while actually crushing, the jaw opening was slightly greater on the roller-bearing machine. So, it will be seen that this official report, a copy of which can be examined in our office at any time, disproves claims of a 40 per cent. saving in power, a two-thirds saving in power, etc.

In addition to these facts, it must also be remembered that the cost of replacement of anti-friction bearings is approximately three times as great as that of bronze bearings, that their installation or replacement is not a field job, and that, in case of failure while in operation, a great deal more delay is encountered than where the crusher is equipped with bronze bushings, which can be quickly and simply installed in the field by any mechanic of average ability. In conclusion, quoting the last paragraph of the Patzig Testing Laboratories' report: "The additional cost of roller bearings and their upkeep in relation to that of the bronze bearings may be such that the apparent savings in favor of roller bearings will be reduced materially or may even be reversed."

The Beauharnois Power Project

(*Continued from page 42*)

considered necessary. If it were desired to operate the plant during the winter months, it would be necessary to provide heat for the sand since, with a low water-cement ratio, the water does not afford sufficient carrying capacity in B.t.u. to furnish the heat required.

The mixers discharge to bottom-dump buckets of 2-cu. yd. capacity which are mounted four on a flat car. Locomotives haul these cars to the job where the buckets are handled by a stiff-leg derrick and traveling gantry cranes which dump them directly into the forms.

The entire crushing and mixing plant is electrically driven. Power is furnished at 550 and 2,200 volts for the three-phase, 60-cycle induction motors used for driving all machinery except the mixers which are operated by squirrel-cage motors. The size of the jaw-crusher motor was chosen with the object of starting the crusher empty without any outside assistance, but it is not used to start the crusher under a load. All 550-volt motors are protected by magnetic switches, while the 2,200-volt jaw-crusher motor is protected by an oil-circuit breaker. Power wiring is carried in conduit for the purpose of minimizing fire hazard, and lighting lines have been run in armored cable. An extensive electric-signal and push-button-control system has been installed to aid in the efficient operation of the plant.

The crushing and mixing plant is only a small part of the entire job. Serving the remainder of the job, in addition to a great deal of other equipment, are 40 miles of standard-gauge railroad track. It is laid with second-hand 85-lb. rail and is rock ballasted. These are unusual features for a construction railway but they are expected to pay for themselves many times over through the elimination of accidents and derailments. Armstrong No. 50-BE all-steel well drills are used for drilling blast holes.

The total number of men employed upon the work to date is about 2,400. The main camp is located at the power-house site, close to the town of Beauharnois, and secondary camps are located along the canal at points convenient to the major operations there. The main camp is equipped with a water-supply and sewage-treatment plant.

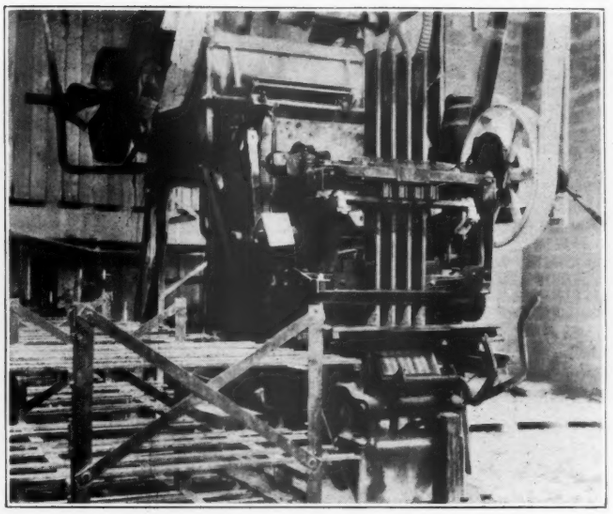
The property is owned by the Beauharnois Power Corp., of which R. O. Sweezey is president and R. A. C. Henry is vice-president and general manager. The engineering is in charge of the following consulting engineers: F. B. Brown, Montreal; T. H. Hogg, Toronto; W. S. Lee, Charlotte, N. C.; and Albert S. Crane of New York City.

The construction work is being done by the Beauharnois Construction Co., a subsidiary of the Beauharnois Power Corp., with F. H. Cothran, vice-president and chief engineer, in direct charge; D. F. Noyes, general superintendent; M. V. Sauer, hydraulic engineer; B. K. Boulton, electrical engineer; R. G. Watson, mechanical engineer; J. A. Knight, designing engineer; P. H. Morgan and A. O. Hawes, assistant superintendents.

Chilean Decree Forbids Foreign Cement in Construction

The Chilean government recently issued a decree making obligatory the use of Chilean-made cement in all government or municipal construction work. The reasons for this action, as set forth in the decree, are: that the national industry may be protected and promoted; that the quality of Chilean cement is equal to the imported; that the national companies have agreed not only to refrain from increasing the price, but to reduce the sale price as much as possible; that the productive capacity of national plants is sufficient to supply the quantity and quality of the domestic demand; and that the present expenditure of 25,000,000 pesos (about $3,000,000) per annum for foreign cement may be curtailed.

Concrete-block plant and open-storage yard.



This machine turns out three concrete blocks per minute.

Stone-Plant Screenings Earn Profit in Manufacture of Concrete Units

Flat Quarry Floor Allows Broken Stone to Be Hauled to Crusher by Motor Truck

DANVILLE, the oldest city in Kentucky, has a crushed-stone plant of more than average interest. While not large in terms of production, this plant has one of the state's best quarries and, adjacent to it, a complete concrete-block factory to serve the needs of the building industry in its community. With a ledge-type quarry, the floor is at ground level, affording an excellent opportunity for hauling blasted rock to the primary crusher by means of a motor truck. The shovel operator is also the truck driver; one man keeps this plant producing at the rate of 300 tons per day!

Kentucky is rich in historic lore, having been the home of Daniel Boone and other pioneers of a century or more ago. Lincoln's birthplace, near Hodgenville, is within its borders; the National Memorial erected to preserve this spot will be dedicated in June of this year. It is interesting to note that the Caldwell Stone Co. of Danville has a bit of history running through its property—Clark's Run, one of Kentucky's most historic streams. Spanning this interesting stream is the plant's belt conveyor from the primary crusher to the scalping screen. About 500 yd. distant was located Crow's Fort, first settlement in Kentucky, and the beginning of Danville.

The block plant of the Caldwell Stone Co. not only utilizes the waste screenings of the crushing

Conveyor from crusher which spans Clark's Run.

Shovel loading overburden to motor truck at the deposit.

The crushing plant and building where concrete products are manufactured as seen from the quarry ledge. At the right, Robt. Gwinn, vice-president and general manager.

plant, but turns them into a sizable profit. Three products are manufactured: faced block, plain block, and two sizes of hollow tile. Standard sizes are made, the blocks being 8 in. by 8 in. by 16 in. and the tile, 5 in. by 8 in. by 12 in. and 5 in. by 4 in. by 12 in. Some precast sills and lintels are also made here.

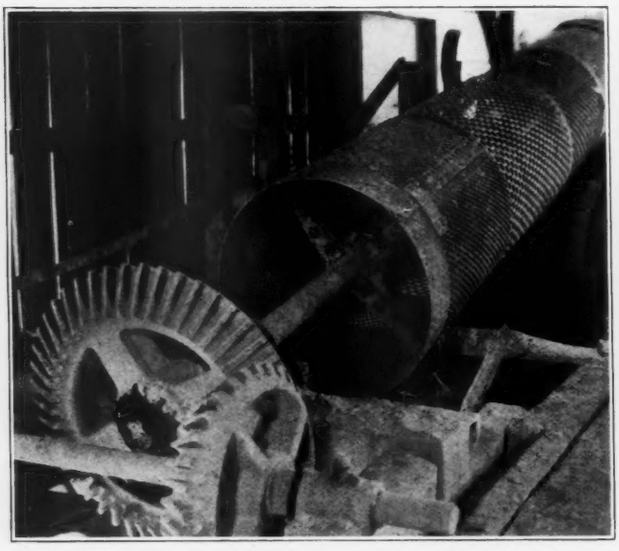
Judging from the type of equipment used and the extensive stock maintained, the importance of this part of the company's business can be realized. A Besser block machine, having a capacity of 3 standard-size blocks per minute, is the chief machine in the plant. It consists of a skip and mixer and a tamping machine. An average batch of 1,600 lb. of cement and screenings is handled, 18 blocks being produced for each sack of cement. The tamping machine applies a pressure of 60,000 lb. per sq. in. to the block in process. A track alongside the machine allows the formed blocks to be placed on racks which are filled and sent to the steam rooms. In these rooms, made of concrete blocks, the blocks are cured. Each rooms has a capacity of 10 racks. With 72 blocks per rack and two curing rooms usually in use, the average daily production is 1,440 blocks.

Three men are needed to operate the plant, although 5 is the usual number employed. By means of systemized operations, each man is required to perform certain duties, thus increasing the efficiency as a whole. Straight-line operation from the block machine to the stock-pile assures the rapid movement of the product.

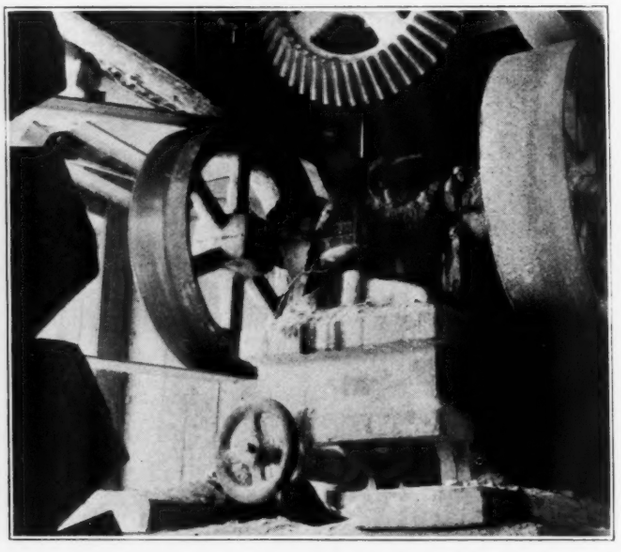
Wabash and Alpha cements are used exclusively in the manufacture of Caldwell concrete products.

The quarry and crushing plant depart from standard practice only in the transportation of blasted rock to the primary crusher. Here a practically flat

(Continued on page 59)



Revolving screen which classifies the crushed stone.



Secondary jaw crusher which produces ¾-in. stone.

Determining the Trajectory of Material Discharged by a Belt Conveyor

IN locating the chute to receive the discharge from a belt conveyor, it is often desirable to take into account the trajectory, or parabolic path, the material will take under the combined influences of gravity, the speed of the belt in feet per minute, and the diameter of the head pulley in inches. The somewhat complicated formulas involved have been worked out by the engineering staff of the Link-Belt Co. in the chart below.

The vertical scales of the chart are so proportioned in their divisions, and relative locations, that the use of a straight-edge will furnish many of the desired data. The right-hand scale shows the diameters of the head pulleys in inches. The inside scale shows the velocities of conveyor belts in feet per minute (F.P.M.) on one side of the line; and on the other side, a value *X*, which is of a convenient length to use for dividing the tangent line into sections (explained later), furnishing division points from which to measure vertical drops in inches (listed in the tabulation at the top of the chart). The lower ends of these vertical lines are points through which the trajectory curve is to be drawn.

The scale at the left is used for finding the value of the angle *B*, which measures the arc of contact of the material on the head pulley starting at the vertical radius *DE*. Lay a straight-edge or taut string across the scales at points indicating the diameter of the pulley and the velocity of the belt involved. The extension through the left-hand scale shows the corresponding value of the angle *B*.

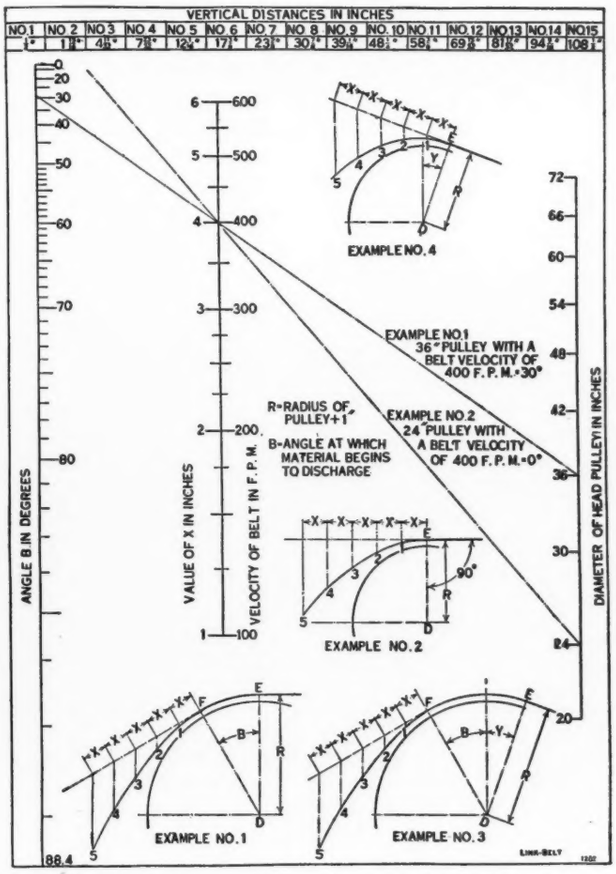

VERTICAL DISTANCES IN INCHES
NO. 1 NO. 2 NO. 3 NO. 4 NO. 5 NO. 6 NO. 7 NO. 8 NO. 9 NO. 10 NO. 11 NO. 12 NO. 13 NO. 14 NO. 15
1" 1 1/16" 4 5/8" 7 5/8" 12 1/4" 17 1/4" 23 1/4" 30 1/4" 39 1/4" 48 1/4" 58 1/4" 69 1/4" 81 1/8" 94 1/4" 108 1/4"
ANGLE B IN DEGREES
VALUE OF X IN INCHES
VELOCITY OF BELT IN F. P. M.
DIAMETER OF HEAD PULLEY IN INCHES
EXAMPLE NO. 4
EXAMPLE NO 1
36" PULLEY WITH A BELT VELOCITY OF 400 F. P. M. = 30°
EXAMPLE NO 2
24" PULLEY WITH A BELT VELOCITY OF 400 F. P. M. = 0°
R = RADIUS OF PULLEY + 1
B = ANGLE AT WHICH MATERIAL BEGINS TO DISCHARGE
EXAMPLE NO. 2
EXAMPLE NO. 1
EXAMPLE NO. 3
88.4

Chart for ascertaining parabolic path of material leaving conveyor.

Starting with an imaginary line representing the straight path of the conveyor as it approached the head pulley, locate a base radius line, *DE*, at right angles to the conveyor line, letting it equal in length the pulley radius plus 1 in., or radius item, *R*, assumed as the effective distance of the load from the center of the pulley.

With the radius *R*, inscribe an outer arc, *EF*, through which the material remains in contact with the belt on the pulley, and draw the secondary radius line, *DF*. The angle *B* is formed by the radii *DE* and *DF*. At the intersection, *F*, draw a tangent line, from which to drop vertical lines to locate the trajectory.

Divide the tangent into sections representing the length of *X* in each case. From the division points drop vertical lines of lengths given at the top of the chart; for instance, at the end of section No. 1, ½ in.; at No. 2, 1 15/16 in.; at No. 3, 4 11/32 in.; and so on, through as many sections as may be required for determining enough of the trajectory to locate the chute properly.

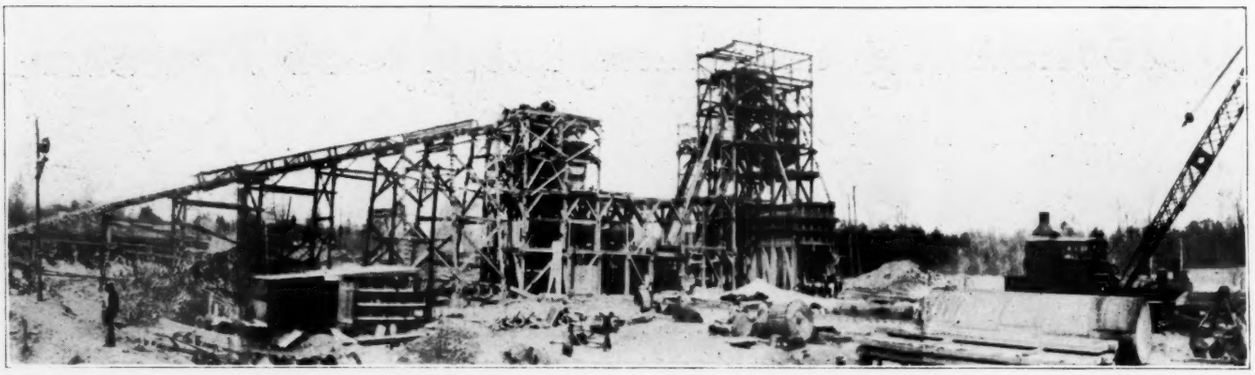
In Example 1, shown on the chart, the conveyor is horizontal, the pulley 36 in. in diameter and the belt speed 400 ft. per min. (F.P.M.). A straight line through 36-in. diameter and 400 ft. per min., on the chart, intersects the degree line *B* at 30 deg. The tangent line is drawn from the intersection, *F*, of the outside circle made by *R*, with the line, *DF*, which indicates the side of the angle *B*.

The tangent line is divided into sections *X* equaling 4 in. each, and, from the division points, lines are dropped vertically to the distances indicated at the top of the chart, namely, ½ in. for No. 1, 1 15/16 for No. 2, 4 11/32 in. for No. 3, and so on, through as many points as are necessary to determine the path of the material until it reaches the chute you intend using.

In Example 2, which deals with a horizontal conveyor, having a belt speed of 400 ft. per min. (F.P.M.) and a head pulley 24 in. in diameter, the line does not indicate any degrees for an angle *B*, and the material would leave the pulley at its top. The tangent line would be a continuation of the conveyor surface, counting the effective distance of the load from the center of the pulley as being 1 in. above the face of the pulley, as previously explained.

Examples 3 and 4 introduce the modifying influence of an inclined instead of a horizontal path

(Continued on page 59)



View of the plant under construction, showing washing, screening and storage facilities with conveyor from crusher in quarry at left.

Builds New Crushed-Stone Plant to Fill 1,000,000-Ton Highway Contract

Production of 200 Tons per Hour Planned When Work at Winnfield, La., Is Completed

EARLY in the year, R. S. Wilson, president of the Big Rock Stone & Material Co., Little Rock, Ark., and A. C. Butterworth, president of the General Material Co., St. Louis, Mo., entered into a contract with the Louisiana State Highway Commission to furnish 1,000,000 tons of stone for Louisiana road construction within a period of fifteen months.

The Louisiana Quarry Co., Inc., was incorporated with Mr. Wilson as president, Mr. Butterworth as secretary-treasurer, and Snow Wilson, Jr. as general manager. This new company then contracted with the Southern Mineral Co., Winnfield, La., for a lease of the latter company's property, upon a royalty basis.

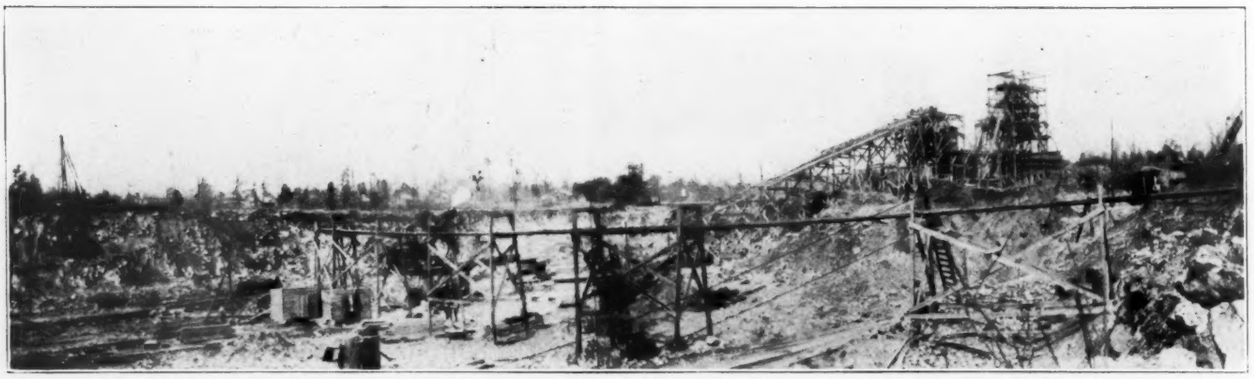
To meet the delivery stipulations, it was necessary to erect a new plant promptly so, on Jan. 19, 1931, construction was started upon a plant that will produce 200 tons of crushed and washed stone per hour. This plant was designed by the Allis-Chalmers Mfg. Co. and contains the following principal pieces of equipment manufactured by that company: a No. 12K crusher, two 10-in. Newhouse crushers, three 6-ft. by 20-ft. scrubbers and sand washers, and ten sets of vibrating screens, Rolman manganese cloth being used on the screens.

Rock is loaded from the quarry face, with 3-cu. yd. shovels, into Hug Roadbuilder trucks, each of 10-cu. yd. capacity and hauled to the No. 12K or primary crusher which is erected in the quarry. From this crusher the stone is taken by a Stephens-Adamson 36-in. conveyor, on 375-ft. centers, to the main plant and delivered to the two 10-in. or secondary crushers. The pulley on the head shaft is lagged with maple to prevent slippage, while a ratchet and pawl on the shaft is a precaution against a reversal of travel in case of power failure when the belt is loaded. This long belt is provided with a gravity take-up and Timken bearings.

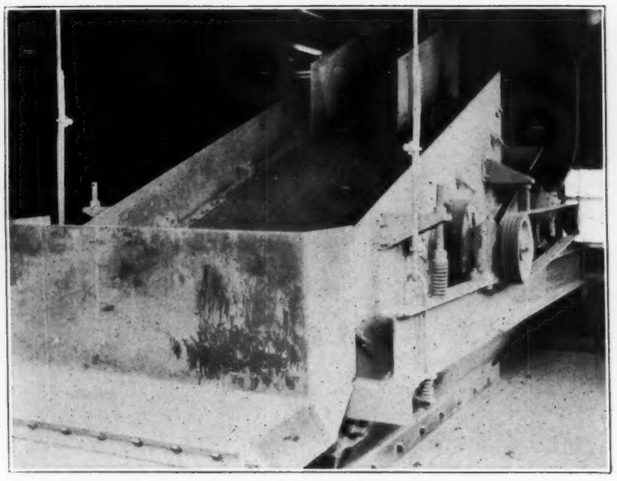
From the secondary crushers, the stone goes through the scrubbers and over the screens to the separate bins.

The plant is electrically equipped throughout, it being necessary to construct a high-tension transmission line, 72 mi. long, from Sterling, La. A railroad track, 2½ mi. in length, has been laid to con-

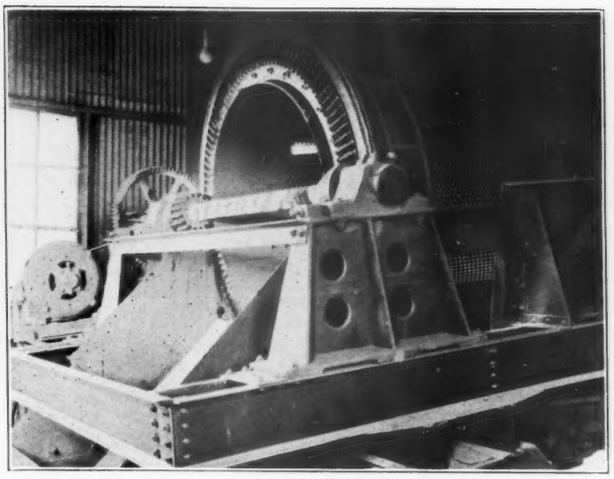
(*Continued on page 53*)



The crusher being erected in the center of the quarry floor. Plant in background at right. Well drill at extreme left.



One of the 4-ft. by 8-ft. single-deck vibrating fine-sizing screens.



Drive end of one of the 60-in. by 20-ft. revolving screens.

Simplicity Is Keynote in Design of New Slag Plant at Detroit, Mich.

Material as Discharged by Furnaces Is Transported by Motor Trucks and Barge

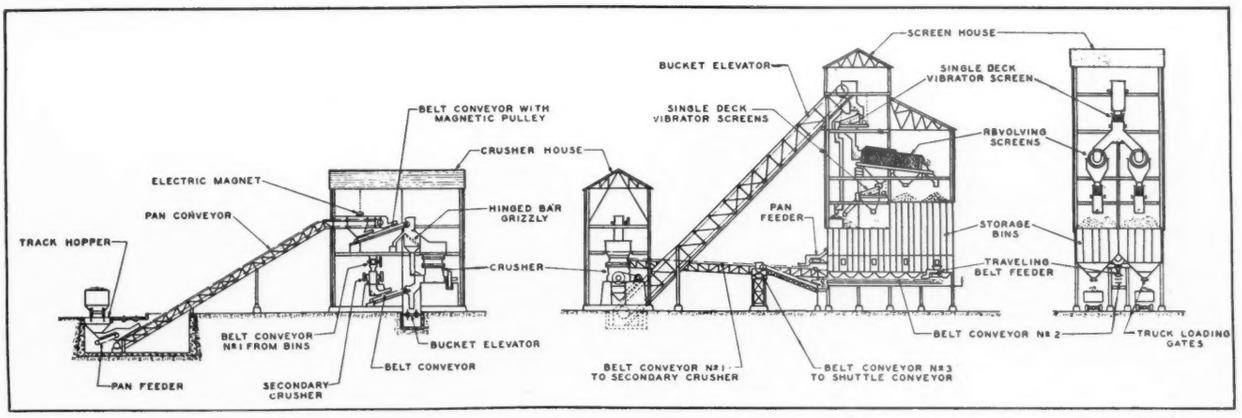
By W. E. TRAUFFER

THE slag industry, although limited in size by the comparatively few sources of supply and by the limited amount of slag that can be secured at these sources, can justly be proud of its modern plants. Probably in none of the other nonmetallic mineral industries is the average plant so well-designed and built and so efficient in operation. This is the more remarkable because most of the slag plants are of small or medium size, very few of them having a capacity of over 200 tons per hour.

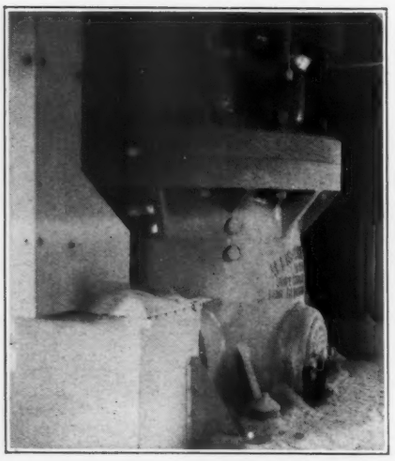
An outstanding example is the new plant of The Detroit Slag & Dock Co. at Detroit, Mich., which went into operation in October, 1930. The plant is of all steel and concrete construction and has a capacity of 250 tons per hour. It was designed by W. W. Patnoe, under whose direction the plant was erected and the machinery installed. Most of the equipment, except the crushers, was furnished by the Stephens-Adamson Mfg. Co.

Simplicity is the keynote of the entire design and this has been attained without sacrificing flexibility or efficiency. The foundations are of concrete, the building and conveyor framework are entirely of structural steel, and the buildings are inclosed with corrugated metal siding and roofing. Steel sash windows with wired safety glass are used exclusively.

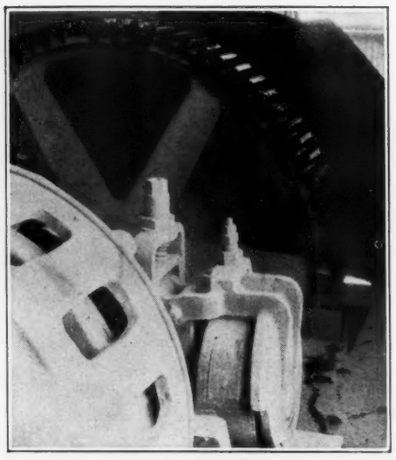
The plant is located at the foot of West End Ave. about 5 miles west of downtown Detroit. The only part of the plant that is not fireproof is the dock, which is of timber construction. This is 600 ft. long and is supported on 75-ft. piling. The unusual length of piling was necessary because of the unstable subsoil conditions along the River Rouge.

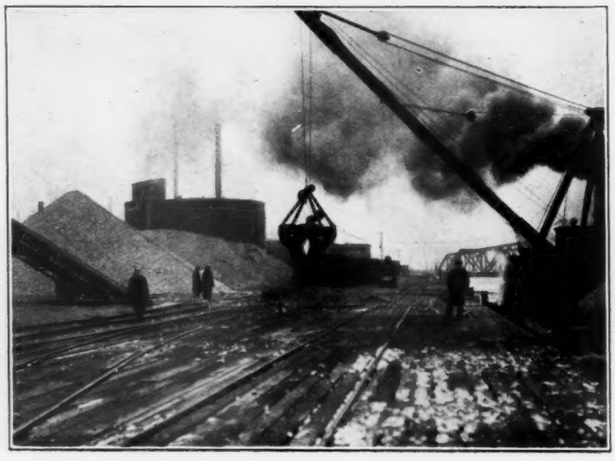


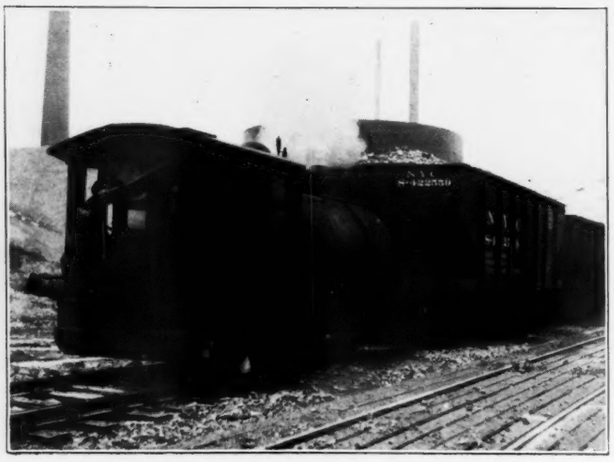
Left to right: Cross-section of track hopper and crusher building; end section of crusher building and side section of screening and storage building; end section of screening and storage building.



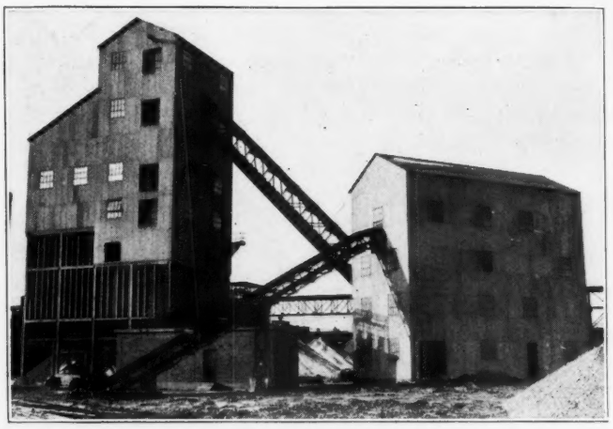
Left—The 18-in. gyratory primary crusher, the chute at the left by-passing undersize from the grizzly above. *Right*—Drive of bucket elevator to top of slag-screening plant, with magnetic brake in foreground. *Center*—Pan conveyor to crushing plant with elevator to screening plant at left, the low brick building at the left being the power-house. *Lower Left*—Barge at plant dock unloading slag to hopper, the pan conveyor to the plant being shown at extreme left. *Lower Right*—Cars of slag being spotted by 20-ton steam locomotive.





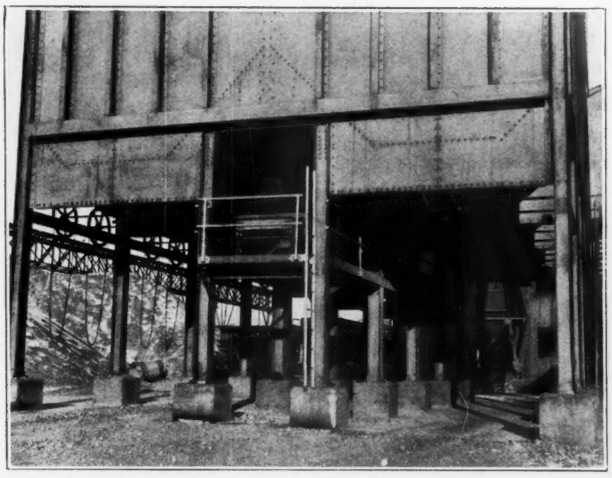


Slag for this plant is secured from several sources. Some comes by rail from the furnaces of the Hanna Furnace Co. on Zug Island. The company has a Bucyrus-Erie 50B Diesel-driven shovel at that point to load the slag into bottom-discharge railway cars and a Baldwin 82-ton steam locomotive to do the switching. The company also has men there to cool the slag as it is run into pits. The other source of supply is at the furnaces of the Ford Motor Co. at River Rouge. Here the loading



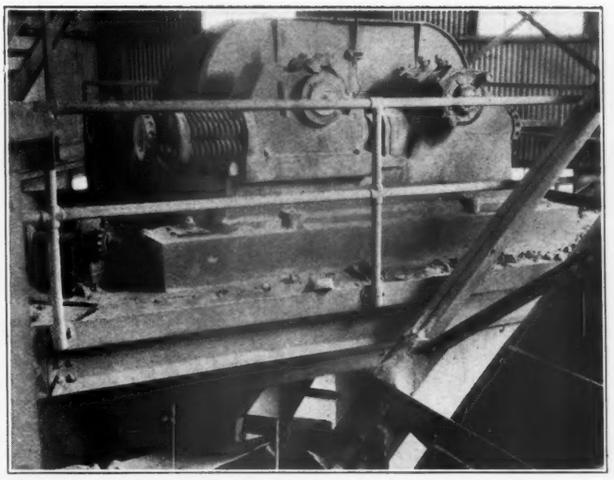
General view of plant with crusher building at right and screening and storage building at left.

is done by the furnace company either into trucks or into a 500-ton-capacity barge owned by the company. This barge has boilers for operating the unloading machinery which consists of a timber stiff-leg derrick handling a Williams 2-cu. yd. clam-shell bucket. Towing is done by a hired tug boat. Switching and spotting of cars at the plant is done by a Davenport 20-ton steam locomotive.



Close-up view of bins showing chain control of gates for truck loading. Arrangement for car-loading or stock-piling is shown.

The cars or trucks discharge directly into the plant hopper under the track. The barge ties up at the 600-ft. timber dock at the plant and unloads to the same hopper. The hopper is of steel and concrete and has a capacity of 30 tons. An 18-in. rail grizzly keeps out pieces of slag too large for the primary crusher which are sledged to size. A Stephens-Adamson 42-in. pan feeder discharges to

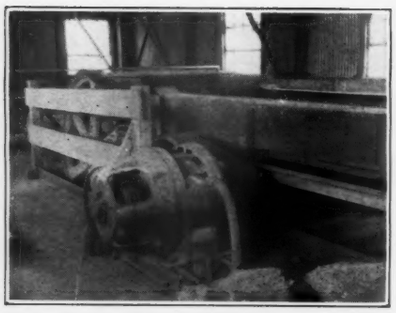


The double-roll reduction crusher. Elevator to screening building at right.

a 42-in. inclined pan conveyor on 120-ft. centers to the crusher building.

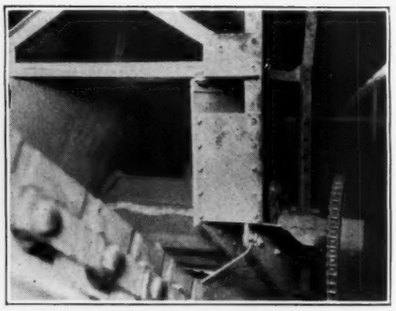
The pan conveyor becomes horizontal for 18 ft. where it discharges onto an inclined feeder belt conveyor on 21-ft. centers. This has a Dings 24-in. diameter by 48-in. wide high-intensity magnetic head pulley to separate out particles of iron from the slag before it gets to the crusher. This pulley attracts the iron in the slag to the surface of the belt as it rounds the pulley. As the belt leaves the under-side, the iron is forced away from the pulley and out of the magnetic influence. The separated iron drops through a chute onto a pile from which it is periodically hauled away. This conveyor discharges over a sloping bar grizzly with 2½-in. spacing. The oversize is chuted to an Allis-Chalmers 18-in. Superior McCully fine-reduction gyratory crusher, the product of which, together with the material passing through the grizzly, goes to an inclined chain bucket elevator to the top of the screening building. The pan conveyor is driven at its head pulley by a 40-hp. Allis-Chalmers variable-speed induction motor through a Texrope and gear drive. The hopper feeder is driven from the tail pulley of this conveyor and the magnetic-pulley

The short belt conveyor feeder with its magnetic head pulley which removes all iron before slag goes to primary crusher.



The drive end of the pan conveyor from the dock to the crushing plant.

Interior of power house with switchboard and generator set for magnetic separator.



The pan feeder under track hopper with pan conveyor in foreground.

feeder from its head pulley. The crusher is Texrope driven by a 150-hp. General Electric motor.

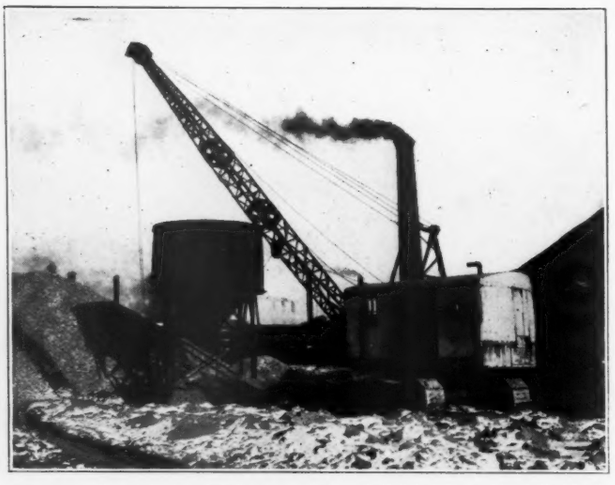
The bucket elevator discharges at the top of the screening plant onto a Stephens-Adamson 5-ft. by 8-ft. single-deck vibrating scalping screen with 2½-in. mesh wire cloth. The oversize drops through a 10-in. steel chute to an oversize bin. This bin feeds by means of a self-contained feeder onto a 24-in. belt conveyor on 63-ft. centers back to the crusher building where it discharges into an Allis-Chalmers double-roll crusher. This in turn discharges onto a short belt conveyor and back into the same elevator to the screening plant.

The pan elevator is driven through a Texrope and double-reduction gear drive by a 50-hp. Allis-Chalmers motor. A Clark Three C magnetic brake prevents reversing of the elevator under load in case of a power failure. Each of the two rolls of the reduction crusher is individually driven by a 20-hp. Allis-Chalmers motor through a Texrope drive. The short conveyor to the elevator is chain- and gear-driven by a 5-hp. Allis-Chalmers motor.

The material passing through the scalping screen discharges through a split chute into two Stephens-Adamson 5-ft. by 22-ft. heavy-duty revolving screens. These have 1⅛-in. perforations on their main jackets and ⅝-in. perforations on their 12-ft. outer jackets. These screens are of extra-heavy construction and are mounted on a massive structural steel framework. The two larger sizes produced, 1-in. to 2½-in. and ⅝-in. to 1-in., are chuted directly to bins. The material under ⅝-in. in size drops to two Stephens-Adamson 4-ft. by 8-ft. single-deck vibrating screens with ¼-in. mesh wire cloth. The two sizes produced are also chuted to storage. A chain hoist on a track over the revolving screens is used for changing the screen cloth.

The vibrating scalping screen is Texrope driven by a 7½-hp. Allis-Chalmers motor and each of the vibrating sizing screens is driven in the same manner by a 5-hp. motor. Each of the two revolving screens is driven through a Texrope and gear drive by a 25-hp. motor of the same make. Rol-man

Left to right: A. L. Lisius, superintendent; W. W. Wideman, electrician; K. W. Burks, office manager.



The gasoline crane which rehandles sized slag from stock-piles for shipment.

double-lock mesh manganese screen cloth is used on the screens and Rol-man manganese steel-plate chute lining is used on all chutes. All chutes except those feeding sized material to the bins have stone boxes to minimize the wear.

The nine-compartment steel storage bin under the screening building has a total capacity of 1,700 tons. Excepting the oversize compartment they are in two rows of four compartments each. All of the compartments load from below into trucks through rack and pinion gates which are chain-controlled from the ground. At present no rail shipments are made but provisions have been made for the installation of a 30-in. shuttle conveyor under the bins for car-loading. A traveling feeder which will minimize the wear on the shuttle conveyor is now in place. This

conveyor will also later form part of an extensive stock-piling conveyor system, the foundations and framework of which are already in place. A 24-in. belt conveyor, inclined for 92 ft. and then horizontal for 23 ft., will feed to a 160-ft. shuttle conveyor on the stock-piling system which will allow storage at any point of the conveyor. At present stock-piling is done by trucks and rehandling and loading by a Northwest gasoline crane equipped with a 1½-cu. yd. Blaw-Knox clam-shell bucket.

The power house between the two main plant buildings is a neat one-story concrete and brick structure. On its roof is the plant outdoor substation which furnishes 440-volt alternating current for all plant motors. This building houses the switchboard and the General Electric motor-generator set which furnishes direct current for the Dings magnetic separating pulley. Cutler-Hammer starters and Square D safety switches for all of the important machinery are also located here. Among other miscellaneous equipment are an Alemite Electrogun for lubricating the machinery and a Weldit Acetylene Co. welding set. The plant office is conveniently located at the entrance to the yard and houses the general and private offices of the company. A Fairbanks beam scale is used for weighing truck shipments.

The main office of The Detroit Slag & Dock Co. is at 1917 Pennobscott Bldg., Detroit, Mich. Officers are: H. P. Eells, Jr., president; Samuel Eells, vice-president; J. E. Heidgen, secretary; and W. P. Kelly, treasurer.

Natural Sodium Compounds Produced in 1930 Show Increase

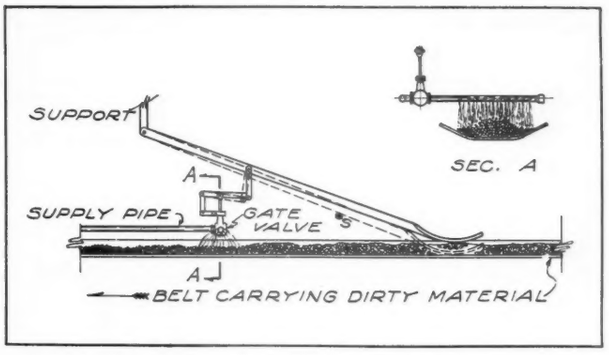
The production of sodium compounds, not including common salt, from natural salines and brines in the United States in 1930, as indicated by sales or shipments by producers, amounted to 294,910 short tons valued at $6,879,529, it is announced by Scott Turner, director, U. S. Bureau of Mines. These figures include the output of sodium carbonate (soda ash, sal soda, and trona), sodium bicarbonate, sodium sulphate (salt cake and Glauber's salt), and sodium borate (borax and kernite), and show an increase in both quantity and value as compared with the output of 275,190 short tons valued at $6,107,666 in 1929.

The sodium carbonates reported were from California and Wyoming and amounted to 120,400 short tons valued at $1,774,104. They were produced in California from Owens Lake, Inyo County, by the Inyo Chemical Co. (I. W. Hellman Bldg., Los Angeles), Cartago (soda ash and sodium bicarbonate); the Pacific Alkali Co. (Pacific Mutual Bldg., Los Angeles), Bartlett (soda ash); and the Natural Soda Products Co., Keeler (soda ash, sodium bicarbonate, and trona); and from Searles Lake, San Bernardino County, by the Westend Chemical Co. (Syndicate Bldg., Oakland, Cal.), Westend (soda ash); and in Wyoming by the Wyoming Soda Products Co., Green River, Sweetwater County (sal soda).

The sodium sulphate (salt cake and Glauber's salt) shipped amounted to 30,100 tons valued at $188,348.

Automatic Conveyor Device Controls Supply of Washing Water

The accompanying sketch shows a simple, plant-made device for the automatic control of wash water flowing on dirty materials when being handled on a belt conveyor. Sec. *A* shows a gate valve and a spray-pipe extending transversely above the conveyor. The other view shows a long piece of strap iron hinged to a rigid support at its upper end and forged into a spoon shape at its other end. At its lowest position, this bar rests upon a stop *S*, with



Device for automatic control of washing water.

the curved part just missing the surface of the belt. As the dirty material approaches, the bar rides upon it and, through the link mechanism, opens the valve a distance proportional to the depth of the material. If no material is being conveyed, the water is completely shut off.

This device has given excellent results on a 30-in. conveyor, using a 1¼-in. valve and pipe, according to F. W. Herkel, superintendent for the Material Service Corp.

Builds New Crushed-Stone Plant

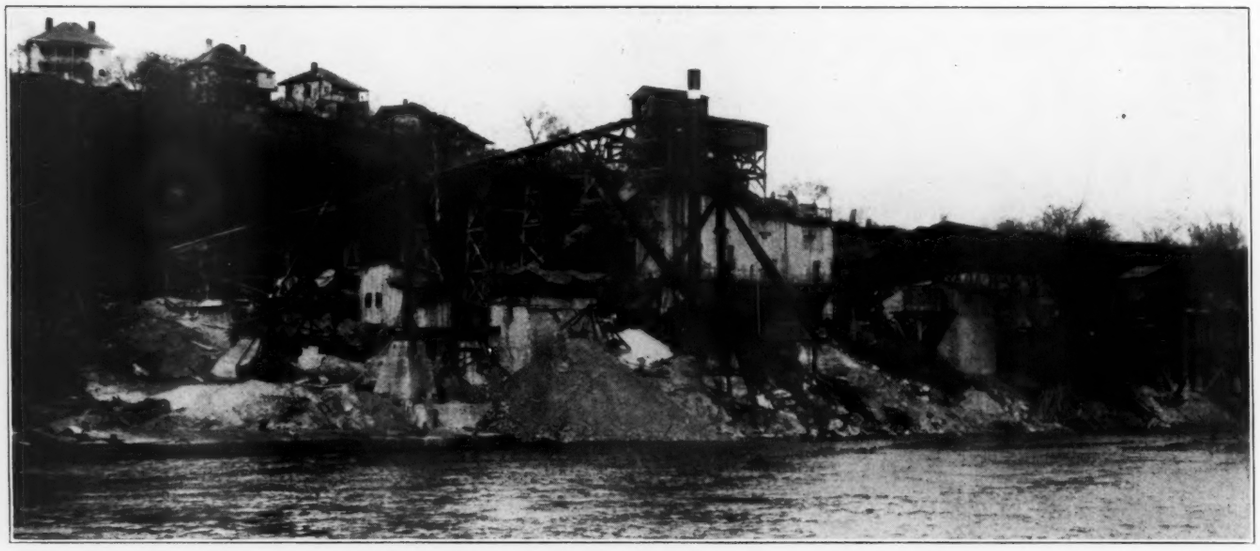
(*Continued from page 48*)

nect with the Louisiana & Arkansas Ry. In the construction of this track, part of the roadbed was laid as a dam to impound water in an artificial lake of about seventy-five acres, the fill material being the overburden that was necessarily stripped from the quarry deposit. The water in this lake provides the supply for the washing of the crushed stone.

Thorough washing is particularly necessary in this case because the raw material does not occur as a ledge of rock but as a bed of boulders and mud.

In order to complete this construction project by April 1, it has been necessary to operate 24 hr. per day, so a lighting plant was installed early to illuminate the railroad-building and stripping operations on the night shifts. These two portions of the project were accomplished by the Gifford-Hill Co.

H. M. Cryder of the Carmichael-Cryder Co., St. Louis, Mo., has been in charge of all plant construction, and the owners express their satisfaction in the record which was made, considering the adverse seasonal conditions.



The Cherokee Sand & Gravel Co. plant as seen from the river.

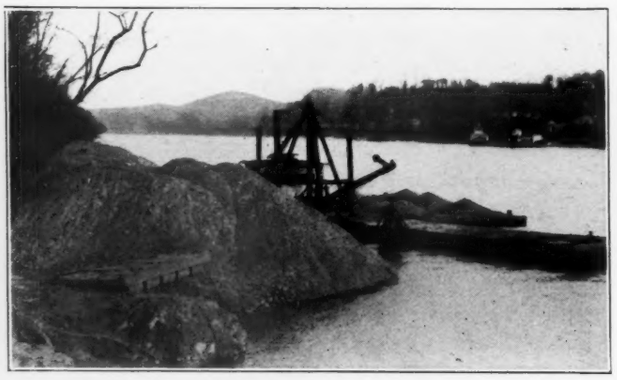
Low River Levels Compel This Producer to Build Up Large Stock-Pile

Three Dredges Operated by Knoxville, Tenn., Plant to Fill Normal Market Requirements

By MAT F. BEISBER

PROLONGED periods of drought become a serious menace to producers of aggregates from river beds. Low river levels hamper the movement of barges and river steamers, and frequent tie-ups result in the curtailment of production. Boats with a draught of 24 in. and less found difficult navigation on the Tennessee River in Eastern Tennessee during the past season, and, judging from present low river levels, another season of difficult navigation and possible curtailment of traffic is expected.

To protect itself from the loss of business through a failure to meet orders because of these conditions, the Cherokee Sand & Gravel Co. of Knoxville, Tenn., has "made hay while the sun shone." Through continuous production during the winter season of near-normal water levels, a huge stock-pile of raw material has been built along its water-front. It is estimated that the material thus stored amounts to 40,000 cu. yd. With continued daily production an even larger amount will be stored. This stock-pile, with what materials can be obtained within the immediate vicinity, will insure a sufficient supply for the busy season. In addition to a raw-material storage, the company maintains a 40,000-cu. yd. stock-pile of finished material, served by a 300-ft. gallery conveyor.



Part of the 40,000-cu.yd. stock-pile.

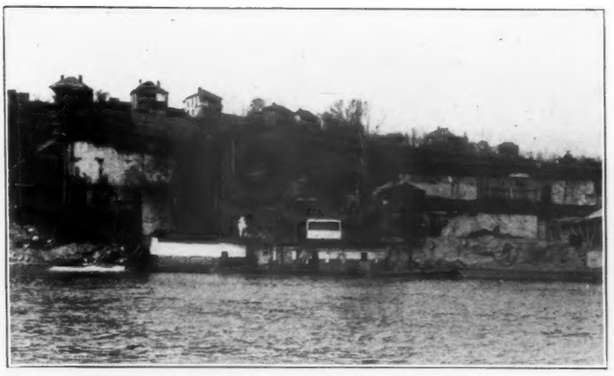
To supply the normal market requirements, three dredges are used, all operating from ten to twelve miles upstream. As there have been no flood stages for several years to replenish near supplies, it has become necessary to operate farther and farther from the plant. One of the dredges has a 2½-cu. yd. shovel, another a 1½-cu. yd. clam-shell bucket, and the third is a ladder-type sand dredge.

The shovel dredge has a 34-ft. by 90-ft. by 7-ft. steel hull and is equipped with a Fairbanks Steam Shovel Co. (now Osgood) 2½-cu. yd. shovel using a 40-ft. dipper stick with a 55-ft. boom. The clam-shell-bucket dredge uses a 1½-cu. yd. Owen bucket manipulated by a Clyde Iron Works derrick and hoist. This derrick has a 50-ft. boom and the hoist is driven by a steam engine. A 100-hp. scotch-marine boiler supplies the steam. The sand dredge has a 50-ft. ladder on which are mounted 32 buckets, each having a capacity of 1½ cu. ft. The hull is 18 ft. wide and 90 ft. long. This dredge carries a complete sand-screening apparatus, and finished materials are sent back to the plant.

Thirteen barges and two tow boats make up the river fleet of the company. The *Cherokee*, a steam-driven stern-wheeler with a 52-ton displacement, easily handles 4 barges. The *Juanita*, a 10-ton gasoline-motor-driven boat using the machinery of a former Pierce-Arrow automobile, handles two of the barges. Each barge is of wood construction and has a capacity of 80 tons of material.

Upon arrival at the company's dock, the barges are unloaded by a Clyde Iron Works derrick using a 1½-cu. yd. clam-shell bucket. An additional derrick of similar size and capacity has recently been erected to double the unloading speed. Both derricks are equipped with 50-ft. booms and use Owen buckets. Three-drum, steam-driven hoists operate the units. Between the derricks is mounted a small steel hopper to receive the raw material. From this hopper the material is fed to a rotary scalping screen driven by a 10-hp. Wagner motor. Four-inch holes in the screen reject the oversize material into a Farrel-Bacon 18-in. by 36-in. jaw crusher driven by a 75-hp. Westinghouse motor. "Throughs" from the scalping screen are sent to the plant on conveyor No. 1, the first of the plant conveyor series. This conveyor, made by Stephens-Adamson, is 100 ft. long between centers, carries a 24-in. Goodyear belt, and is operated by a 15-hp. Allis-Chalmers motor. The jaw crusher is mounted above conveyor No. 1 so that its crushed material falls on the belt.

A second scalping screen, 3 ft. by 18 ft. in size, divides the material for secondary crushing. Local and state specifications call for materials in two common classifications, 2½ in. and down to 5/16 in., or 1¼ in. and down to 5/16 in. This second screen, a rotary unit driven by a 15-hp. Allis-Chalmers motor, can be fitted with either 2½-in. or 1¼-in. screens. The "oversize" is sent by conveyor No. 2 (which is like No. 1 except that it is only 80 ft. long) to a Symons 4-ft. cone crusher, which is set according to the size required and is driven by a 100-hp. General Electric motor. "Throughs" pass on conveyor No. 3 to the plant, and the crushed material is spouted to the same conveyor for the same destination. This conveyor is 198 ft. long, carries a 24-in. Manhattan belt, and is operated by



The towboat "Cherokee" and loaded barge.

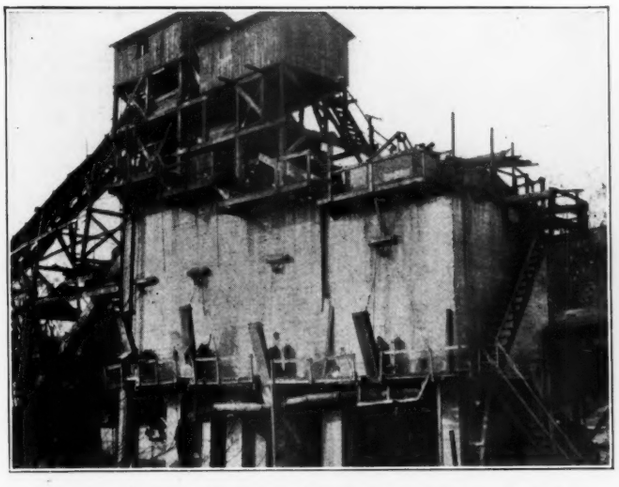
an Allis-Chalmers electric motor of 20-hp. rating.

The classifying-washing screens, located above the storage bins, consist of two pairs of Gilbert conical screens and one pair of Gilbert sand screens, each cone being 4 ft. by 5 ft. by 8 ft. in size. The first pair has 2½-in. openings, the second pair 1¼-in., and the sand screens 5/16-in.-mesh wire cloth. All the screens are driven by a single 10-hp. Allis-Chalmers motor. Oversize "rejects" are spouted to conveyor No. 2 leading to the Symons crusher. The return-circuit conveyor, No. 4, is 48 ft. long between centers and carries a 24-in. belt.

Fine sand will be produced this year in a new settling tank and a drag-chain, now being erected. The present sand-settling tank is 5 ft. by 18 ft. in size and is driven by a 5-hp. Allis-Chalmers motor.

Four sizes of material, including two of gravel and two of sand, are loaded in cars or trucks from a concrete loading-bin structure. Approximately 450-cu. yd. of material can be stored in this bin. For additional storage capacity a gallery conveyor allows an additional 40,000 cu. yd. of finished material to be stocked.

This additional storage system requires a system of four conveyors, as well as ground loading machinery. Conveyor No. 5, which is 138 ft. long and carries a 22-in. Goodyear belt, extends along the bin structure to receive the material and is driven by a 15-hp. Allis-Chalmers motor. Conveyor No. 6, which is 53 ft. long and is driven by a 7½-hp. Allis-



Storage bins and loading chutes under screening building.

Portable loader used for stock-piling.

Crawler-mounted crane pressed into service handling repair parts for the crusher.

Howard Thomas, W. C. Kuenzl, Jr., Pat Heagerty, and W. C. Kuenzl, Sr.

Chalmers motor, handles it to the gallery conveyor, which is No. 7. The latter is mounted on a timber structure at a height of 53 ft. from the ground. It is 308 ft. long and is driven by a 20-hp. Allis-Chalmers motor. A tripper discharges the material wherever desired. Conveyors 5, 6 and 7 are fitted with Goodyear 20-in. belting. At the end of the gallery structure, a Barber-Greene portable conveyor, 40 ft. long, carrying a 20-in. Goodyear belt and driven by a 5-hp. Allis-Chalmers motor, has been suspended in cantilever fashion, acting as a fan conveyor. The use of this conveyor allows the building of piles of materials for a Blaw-Knox batch plant. Swinging the fan conveyor to one side, a pile of one-size material is made; swinging it to the opposite side, another pile of aggregate can be built. When orders are received for batch materials, a Koehring crane moves to a position between the piles with access to each, and thus loads the Blaw-Knox batch-plant hopper.

Motor trucks are loaded direct from the ground-storage piles by means of 3 Barber-Greene loaders. These machines are of the No. 42 type and have been used extensively for materials-handling service. In addition to the loaders, a Koehring gasoline crane, with a 1-cu. yd. Blaw-Knox bucket, finds extensive use in stock-piling and in general machinery- and materials-handling service.

Another innovation at the Cherokee plant is the means of loading cars from the ground-storage pile. The railroad siding, being at some distance from the pile, requires the loading of trucks and their subsequent unloading into some bin or hopper for loading the cars. A concrete sump, fitted with a steel hopper and a bucket elevator, was built at the railroad siding. The elevator extends from the hopper to a point above the cars. Trucks loaded from the stock-pile dump direct into the hopper, and the material is then picked up by the elevator and discharged into the cars. Thirty minutes are required to load a car with this method.

The original design of the plant was made by the Stephens-Adamson Co. of Aurora, Ill. All conveyors, the Gilbert screens, and miscellaneous equipment, were manufactured by this company.

Under normal conditions, the Cherokee Sand & Gravel Co. has a capacity of 900 tons daily. With the installation of additional screening equipment now planned, it is expected that this capacity will be doubled.

The company has been in operation for eight years. It is operated as a partnership of three men, W. C. Kuenzl, H. N. Carmichael, and S. V. Chandler. Under Mr. Kuenzl's management the company has expanded considerably. He is responsible for the design of many pieces of machinery, which were built at the company's own shop. His son, W. C. Kuenzl, Jr., is foreman.

Steel receiving hopper, scalping screen and the jaw crusher at the dock.

The sand-and-gravel plant with dump cars from the pit at the right.

New Plan of Pit Reclamation and Added Equipment Increase Capacity

Present Lay-Out Permits Producer to Turn Out 2,500 Tons of Material Daily

FINDING it necessary to increase its capacity and to widen its pit operations, the Estill Springs Sand & Gravel Co., Estill Springs, Tenn., has added a new tipple-and-screening building to its plant and a scalping-screen-and-crushing unit. A new system of pit reclamation has been adopted. The new improvements have more than doubled the former capacity, and the plant is now able to produce 2,500 tons of material per day. The original plant was built in 1927 and had a daily capacity of 500 tons.

The deposit, from geological studies, is a former river bed, and was reclaimed by means of a slack-line cableway. This operation was described in PIT AND QUARRY, May 22, 1929, page 61.

A Byers Master drag-line with a 1¼-cu. yd. bucket is now used for pit reclamation, loading the raw-material into Kentucky Wagon Co. side-dump cars. Twelve of these cars are in use, each having a capacity of 6 tons. They are operated in two trains of 6 cars each and are hauled to a track hopper by a Porter 18-ton locomotive. About 3,000 ft. of 36-in. track is used. At the plant, the material is received in a track hopper which is served by tracks on each side. As a loaded train arrives on one track, the locomotive switches to the other track, and returns to the drag-line with the train of empty cars. The loaded cars are then moved by gravity to the hopper and are dumped one by one. This system makes possible the most efficient transportation of the raw material under the conditions set by one track and a single locomotive.

Beneath the track hopper, a Link-Belt 30-in. apron feeder transfers the raw material to the scalping-screen conveyor which sends it direct to a Link-Belt 48-in. by 12-ft. scalping screen. Its single jacket

Conical classifying screens.

L. G. Banner, superintendent.

The 18-ton locomotive.

Drag-line loading material from the pit to the end-dump cars.

The belt-conveyor system from the track hopper to the tipple.

has 2¼-in. round perforations. A 15-hp. motor drives the screen and the conveyor. The latter has a 24-in. belt and is 84 ft. long between centers.

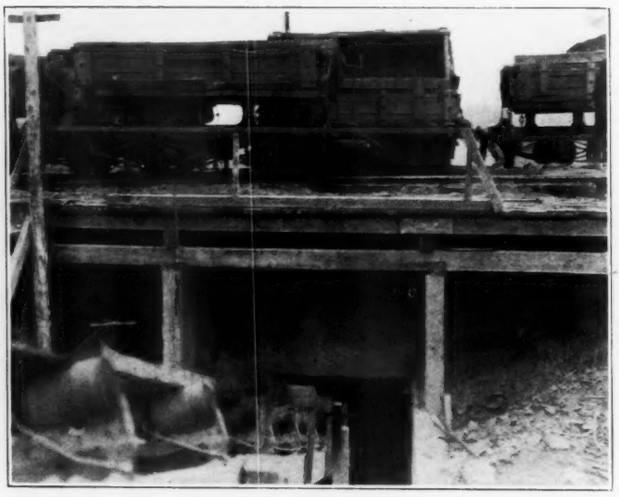
Oversize "rejects" from the scalper are spouted to a Telsmith gyratory crusher which is set at 1¾-in. breakage. Both the crushed material and the "throughs" pass direct to the plant conveyor which transports the combined material to the top of the new tipple into a Link-Belt scrubber. The plant conveyor is likewise equipped with a 24-in. belt and is 233 ft. long on pulley centers; it is driven by a 25-hp. motor. Both conveyors use Link-Belt idlers and return rolls equipped with Timken bearings.

View of the sand classifier in action.

For the processing of the sand and gravel, a scrubber, a set of three Dull screens, and a pair of Perfect classifiers are employed. The scrubber is a 60-in. by 97-in. Link-Belt unit. In it the sand and gravel come into contact with a heavy spray of wash water and, after a thorough scrubbing, pass to the first Dull screen. The three screens are equipped with interchangeable jackets to allow production of the desired grading of gravel. They are 36-in. by 72-in. by 96-in. conical screens and are mounted on a single shaft driven by a 20-hp. motor. The sand and wash water are sent by a flume to two Perfect Classifiers for the production of concrete sand.

One of the bins in the old tipple now acts as a settling box for the recovery of fine sands. All the wash water and discharge from the classifiers is carried by a flume to this bin and the "fines" are precipitated while the waste water is discharged through a long flume to a waste pond.

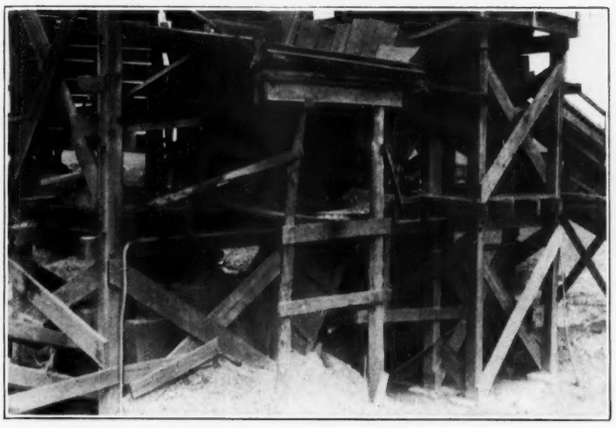
Cars unloading to the track hopper. Empties for return to pit on the track at the left.



Another view of the track hopper with conveyor to the plant in foreground.

The new screening tipple, at left, and the old structure.

For the increased screening capacity an Allis-Chalmers 8-in. centrifugal pump furnishes 1,800 gal. per min. at a head of 150 ft. Each of the spray



Close-up view of the scalping-screen and crusher installation.

pipes in the screens is equipped with a Binks nozzle to secure a maximum washing effect.

The new storage and loading bins add 750 cu. yd. of capacity to the car-loading facilities. There are 5 bins, each having a capacity of 150 cu. yd.

All plans for the new plant were prepared by the Link-Belt Co. and the construction and erection work were directed by L. G. Banner, superintendent for the Estill Springs company. The new plant went into operation during the summer of 1929.

Stone-Plant Screenings Earn Profit

(Continued from page 46)

quarry floor, with no appreciable grade to the primary crusher, offers an ideal opportunity for motor-truck haulage of the blasted rock. A Service 5-ton truck, with many years of hard usage behind it, transports its load with great facility to the primary-crusher hopper. No state license is required for this service as the truck never leaves the company's property. At this quarry not even tires are used, and the operating expenses are kept quite low because the machine has long outlived the normal span of life of trucks used for ordinary haulage.

During the month of February, stripping operations were carried on with a Speeder ½-cu. yd. shovel. With the overburden, layers of soft rock to a total depth of about 8 ft. are removed and hauled away by means of motor trucks. A Ford 1½-ton truck, an International 5-ton truck and two Chevrolet machines, were pressed into this service, the overburden being dumped on the company's property for a large fill.

Ingersoll-Rand Jackhamer drills are employed in drilling operations, the holes being drilled to an average depth of 10 ft. From 15 to 18 holes are shot at once with Trojan powder and caps. From 9 to 10 lb. of dynamite are loaded per hole, and an average season's production of 2½ tons of rock per pound of powder has been maintained. Blasted rock is loaded with the same Speeder shovel into the waiting truck, and the shovel operator drives the truck to the point of dumping.

A Universal 15-in. by 24-in. jaw crusher, located on the quarry side of Clark's Run, does the primary breaking. The 60-hp. motor which drives it also operates an Ingersoll-Rand 2-cylinder vertical air-compressor. From the primary breaker, the stone travels on a 20-in. belt conveyor to a Good Roads 30-in. by 16-ft. rotary screen. Four screen sections size the crushed stone from ¼-in. to 2½-in. "Tailings" are chuted into another Universal crusher, a 8-in. by 16-in. unit set at ¾-in. and driven by a 40-hp. motor. Crushed material from the secondary crusher is elevated to a second rotary screen which sizes it from ½-in. to ¾-in. Bins beneath have a capacity of 250 tons of finished stone.

Delivery is made entirely by trucks. A recent large project to which the Caldwell Stone Co. furnished its product was the Dix Dam job, which involved raising the height of the spillway for greater water storage.

Determining Trajectory of Material

(Continued from page 47)

for the conveyor as it approaches the head pulley, and the effect of the velocity on this item.

To determine whether the load will start to leave the pulley at E or at F, find an indicator figure by the following formula:

$$\text{Indicator figure} = \frac{V^2}{G \times R \times \cos Y}$$

where V = the velocity in feet per second; G = the action of gravity, or 32.16 ft. per sec.; R = the radius, R, measured in feet; Y = the angle of inclination of the conveyor. If the indicator figure is less than 1, the trajectory begins at F (Example 3), angle B remaining the same as for a horizontal belt (30 deg. in this case). If the indicator figure is more than 1, the trajectory begins at E, as in Example 4.

In Example 3, using the same data as in Example 1, except that the conveyor is inclined 20 deg. (equaling angle Y), the indicator figure from the formula is less than 1, and the trajectory starts at F, 30 deg. to the left from the vertical radius line.

In Example 4, using the same date as in Example 2, except for an incline of 20 deg., the result of the formula is greater than 1, and the trajectory starts at E, at an angle of 20 deg. to the right from the vertical radius line.

Suggested Strength Specifications for Ready-Mixed Concrete Plants*

By J. L. SHIELY
J. L. Shiely Co., St. Paul, Minn.

STRENGTH specifications provide a subject that can be treated in a highly technical manner, or this phase may be left to the technicians for solving and the subject treated in relation to the effect strength specifications have on commercial-concrete merchandising.

I feel that my approach to the subject from the position of a manufacturer, with some discussion of the difficulties encountered in the practical application of strength specifications, would be of greater interest to those assembled here than a technical analysis of the specifications themselves.

If the difficulties encountered are to be corrected, they must be presented to the agencies that are recognized as authoritative in specification and testing, so that a standard, that will have universal acceptance, may be adopted. The ready-mixed concrete business today, as I see it, needs two fundamentals to make it a success.

First, its standards must be of the highest so that its products will be accepted universally as the best. We must not permit a compromise with quality if the business is to prosper. Second, these standards must be guaranteed and made part of the contract with the customer. Discussion of the first fundamental is unnecessary. Past criticism of cement handling has justified our very existence, and we must be dependable wherever we are located. An indifferent operator remotely situated may bring the industry into disrepute, since architectural and engineering firms, for the most part, are national in character.

The setting of standards that can be guaranteed to the customer involve many more difficulties than are, at first, perceptible. Coöperation is required from existing technical organizations and those engaged in the business of seeing that standards are maintained. Concrete for commercial or sales purposes involves new phases in specifications if they are to be made part of the selling agreement. The American Society for Testing Materials standards are generally accepted as the basis of the quality of concrete.

Let us consider the producer who is about to sell a job and must guarantee the strength of the concrete he is to deliver. He must have a complete understanding of his responsibility. It is no longer sufficient to agree to furnish strength concrete for a stipulated price and then leave the matter of workability to the individual foreman on the job. He must understand at which point in the process of placing this concrete his responsibility ceases and where the testing of his product occurs.

The relationship between water and cement limits the amount of water which can be added to cement when mixed with the proper quantities of fine and coarse aggregate. If a wetter mix is necessary to facilitate placing the concrete, the producer is compelled to add more cement to maintain the guaranteed strength. This increases the cost of production, for which he should have compensation. Therefore, his contract should provide for a stipulated slump at the point of acceptance of his product and a sliding scale of prices for slumps above or below that agreed upon. He should insist on cylinders being taken from the delivery vehicle so that he can not be held responsible for methods of handling which might cause segregation or deterioration in his product. He must be sure also that the handling, curing, and breaking of cylinders are done correctly according to A. S. T. M. standards.

It has been my observation in many visits to plants all over this country that large producers of concrete, almost universally have been obliged to do testing paralleling that done by agencies in the business of testing. This has been necessary, in most cases, to check some of the carelessness that seems too prevalent in this important matter. Too often the human element has carelessly handled a cylinder that later showed the effect of this carelessness in its breaking strength. Too often it has been necessary to core a slab to satisfy the customer that his testing was inefficient.

Instances of cylinders that tested below required strengths have resulted in claims for damages and, naturally, the general public can not readily understand the reason therefor. I am inclined to believe that a general clause should be inserted in every contract providing that, when the average of cylinders taken shows strength up to requirements specified. the producer's obligation should be considered fulfilled.

We should recognize that the errors of the human element are just as prevalent in our own plants as in the testing laboratories, and tests conscientiously made sometimes will show failure to meet requirements because of this human element. While these errors are only remotely possible with modern equipment, nevertheless they may occur and a clause should be inserted in every contract which will clearly define the responsibility of the producer in that event. This is necessary so that the contract will not be in controversy.

I have purposely treated the assignment given me in this manner for the reason that a concern entering this business should know something of its perils. Concerns have been expected to pay damages when all cylinders have not met specified requirements and these damages have been very con-

(Continued on page 64)

* Address at National Ready-Mixed Concrete Assn. annual meeting, Jan. 26, 1931, at St. Louis, Mo.

The Limitations of Present Knowledge of Concrete Construction*

By A. E. LINDAU
President, American Wire Fence Co., Chicago

"The final conclusion is that we know very little, and yet it is astonishing that we know so much, and still more astonishing that so little knowledge can give us so much power."—BERTRAND RUSSELL.

THERE seems to be a lurking suspicion in the minds of conservative souls that the concrete industry is founded on the loose sands of enthusiasm, that it is permeated with propaganda and sales talk, that those who are engaged in the industry and advocating the use of concrete are blind cultists worshipping a false god, sincere perhaps, but nevertheless blind.

We may be justified in admitting that the pioneers in the industry were more or less blind to the limitations of the material with which they were working. Perhaps it would be more accurate to say that they had a blind faith in the ultimate value and usefulness of concrete, and naturally so, since there was so much to be learned, so much territory to be explored before the main road to progress became at all clear.

On the other hand it must be admitted that few industries have more frankly acknowledged their problems, or set about more earnestly and industriously to solve them, in order that we may proceed with skill and confidence.

It is truly astonishing how much information has been accumulated in the few years that concrete has been investigated and studied. We seem to have a superabundance of data and related facts pertaining to concrete under a great variety of test conditions and practical applications. But it seems each advance in our knowledge opens up new questions and new fields for investigation until it has become a serious question whether we are not acquiring knowledge more rapidly than we can digest it or put it to practical use.

The engineer naturally demanded a great deal of fundamental information bearing on the strength and the mechanics of design of reinforced concrete before rational and satisfactory rules of proportioning structures could be formulated. In formulating these rules it developed that a vast amount of detailed information was required in order to produce a structure of balanced design—that is, a structure in which all the parts had substantially the same strength or factor of safety. Lack of knowledge—or sufficient information to inspire confidence—in any important direction, placed a limitation on the use of the material, placed a barrier as it were in the road of progress and halted the procession until this particular area had been explored and investigated and the limitations reasonably well determined. These investigations developed extensive research programs covering years of time and volumes of data to clear away the doubts surrounding a single important element of design or method of construction.

Since we are continually finding new uses for concrete, or using it under new or different conditions, we are finding a continuing demand for further research or more complete data, until it seems as though we shall always be in the midst of test problems and programs of investigation.

However, out of all these accumulative data, there emerge a few simple, fundamental principles that appear to control our practice and correlate our observations to the end that in our use of the material we may proceed with certainty and understanding.

It is my purpose to discuss briefly the extent to which our present knowledge limits the use of concrete and reinforced concrete in some important particulars.

Compressive Strength Important

The compressive strength of concrete ranks first in the important properties. It has served as a measure of general quality and, except for pavements, is still the only general-acceptance test that is recorded even in connection with our most important structures. Many thoughtful students of the subject challenge the importance that has been given the matter of strength and feel that durability and other qualities have been sacrificed to the twin gods of Strength and Economy.

Through the development of the water-cement-ratio principle, we have secured remarkable control of the important properties of concrete and particularly that of strength. Concrete can now be made of standard ingredients and under average conditions of curing, to meet specified strength requirements with a surprising degree of accuracy. In fact, contractors have been willing to assume contracts based on furnishing concrete of a specified minimum strength, instead of the old and still the more common method of fixed proportions of ingredients, thus placing concrete on somewhat the same basis as structural steel as regards specified strength for a structural member.

But a new factor affecting the strength of concrete has recently entered the field. Cement manufacturers are placing cements on the market that produce concrete of high-early strength, which means that at 7, 14 or 28 days these new cements will make appreciably stronger concrete than standard Portland cement using the same water-cement ratio.

Although recent studies by Prof. Duff A. Abrams

*An address delivered Mar. 5, 1931, at the New York meeting, American Society for Testing Materials.

seem to indicate that the older, slowly-setting cements will ultimately reach the same strength as the newer types, the strength at some early period, such as 28 days, must still remain an important element in design. To take advantage, therefore, of these newer cements we may have to revise our ideas with regard to working stresses and dimensions of structural members, also changes in our normal Portland cements have given us higher strength at early ages, thus making it possible to reduce the cement factor in concrete with the result that now we can deliver concrete of a given strength requirement with appreciably less cement per cubic yard than formerly. This introduces a new factor—the question of minimum cement content per unit of concrete.

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In view of the foregoing situation, it would seem logical to step out and make use of our 5,000-lb. concrete, reduce our costs perhaps or in any event build "bigger and better" structures. And so it would, were it not for the fact that concrete is a plastic rather than an elastic material. Under sustained loads producing stresses 30 to 40 per cent of the breaking strength, we find that concrete tends to deform or yield as time goes on. The specimen under compressive stress becomes measurably shorter without an increase in the load. This shortening fortunately is not great, although it is of order of 1 to 1½ inches in one-hundred feet of length. This would mean a shortening of the height of the columns in a ten-story building of about 1½ inches or approximately ⅛ inch per story height. At first glance this may seem a little alarming, but it is probable that the walls both inside and outside undergo similar adjustments so that on the whole it may be a favorable rather than an unfavorable phenomenon.

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confronted with the problem of accepting concrete which meets all strength requirements but with so small a quantity of cement as to make it porous. Competitive production of concrete by central mixing plans in which the only basis for acceptance may be the specified strength requirement is likely to prove as unfortunate for durability as the period which we are just leaving, in which we had "water, water everywhere, but not a drop to drink." While test data on permeability are a little meagre, what we have indicates that the rich mixes give the best results and that we shall need at least a certain minimum amount of cement per cubic yard of concrete, regardless of strength, in order to insure durability.

In general our conclusions concerning durability have been drawn as the results of observations of structures that have been in service over a period of years. Extensive and comprehensive condition surveys in this country and Europe aided by laboratory tests have given us some very reliable information as to the principal causes for the deterioration of concrete. The excellent report of the Swedish Hydraulic Power Commission covering a country-wide survey of hydraulic structures is summarized in the following: "As far as present publication or information now is concerned probably the principal reason for deterioration of concrete may be found in the dissolving out of the cement on account of percolation of water through the concrete subject to hydraulic pressure on one face. It is, therefore, of the greatest importance that such types of construction and methods of concreting be developed as may be especially effective in the production of concrete that is water-tight or impervious to begin with." Here is the crux of the matter in the class of structures of particularly severe exposure.

Members of Committee 801, American Concrete Institute, have undertaken the most extensive survey of concrete structures ever attempted, giving particular attention to exposed or outdoor structures. The observers learned after a time to read in the appearance of the structure quite accurately its history and method of construction. The same faults in production and placing were observed over and over again. Not that the ingredients of the mix did not play a part now and then in the causes readily assigned to deterioration when it was found, but in the great and overwhelming mass of evidence relating to durability is expressed by Young in his *Lessons from Concrete Structures in Service:*

"Practically everything tending to destroy concrete attacks it through its pores and this is true regardless of whether the ultimate destruction of the concrete is brought about by frost, sulphate or sea-water, corrosive water or chemicals, or the disruptive effect of reinforcement or unsound aggregate. Even volume changes are, in part at least, due to differences in the moisture content of the concrete. It is evident, therefore, that in most cases, the phrase 'durable concrete' is synonymous for impermeable concrete, and this should be the goal of every engineer who has to build for outdoor service."

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Temperature Factors

The question of providing for temperature changes has always been a matter of importance for structural materials in general as well as in concrete. We have interpreted early tests to indicate that the thermal coefficient of concrete is a reasonably constant quantity, of an amount substantially that of steel. Doctor Hatt has shown that we may expect a material variation in this factor depending on the temperature at which it was measured and on the condition of the concrete with respect to its moisture content. Expansion and contraction joints have been in use for years, but we find that even in so-called carefully designed structures the temperature changes have not always been satisfactorily provided for. Apparently the location and spacing of joints in buildings of irregular shape is more a matter of judgment than of scientific knowledge. In certain types of structures, arch-bridges, for example, the stresses due to change in shape caused by temperature variations may be nearly as large as those due to the imposed load.

But other volume changes than those due to temperature variations are continuously in progress, possibly throughout the life of the structure. Professor R. E. Davis, in his paper on volumetric changes in Portland cement mortars and concretes summarizes the situation as follows: "The causes of these volumetric variations are not entirely clear, but perhaps chemical and physical changes within the mass are always involved. The chemist is likely to ascribe this action to shrinkings or swellings of colloids surrounding cement grains. The physicist may ascribe the volume change to capillary tension within the pore space of the mass. But regardless of the fundamental causes, volume change is certainly a factor to be reckoned with in engineering

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design, and concrete structures can hardly be regarded as permanent unless the volume changes that take place with the passage of time, may occur without producing excessive stresses."

On the other hand, F. R. McMillan, in his *Principles of Concrete Making,* concludes that "for the usual structure, where there is no special demand of minimum volume change, it can be seen . . . that a reasonable latitude is afforded in the proportions of fine to coarse aggregate without affecting the volume change. For example, the comparison of 1:2:2 mixes of about the same water cement ratio shows about 25-per cent. difference in shrinkage. . . . Where some provision is made for volume change on any reasonable basis it is quite likely that 25-per cent. variation from that basis would produce noticeable defects in ordinary construction. It is when no provisions at all are made that these volume changes give difficulty."

It is to be noted that the above applies to ordinary structures. When we come to consider extraordinary structures as, for example, the Hoover Dam, we have an entirely different situation. Here volume changes during the hardening or setting of the concrete may become a matter of major importance and our present knowledge may be a little sketchy as a working basis for design.

The limitations of our present knowledge of cement and concrete are likely to be tested in more than one direction in such exceptional structures as the Hoover Dam. The evolution of heat accompanying the setting of cement is not a troublesome factor in ordinary structures where the heat can readily escape by radiation. Indeed in cold-weather concreting it is a distinct advantage. But if the rise of temperature in larger masses of setting concrete approaches the boiling point of water, we are certainly confronted with some such device. We shall, of course, proceed to increase our knowledge in this new area—which means new research—more tests —new discussions and analysis of observation and finally formulation of practice to meet the new situation.

It is surprising and disconcerting to realize how problems multiply with an increase in knowledge. Still it is equally surprising to find these problems solved as sheer necessity demands a solution.

We have confined ourselves briefly to the discussion of some of the most important properties of concrete. A host of other problems in design and manipulations of concrete has, of course, arisen, generally to be solved and disposed of satisfactorily.

In concrete as in other fields, necessity is truly the mother of invention. Should need or demand for a stronger concrete become insistent enough, we shall, no doubt, find a means of obtaining it. Should our best present practice fail to produce durability, we shall undoubtedly develop methods that will do so. Should we find it absolutely necessary to more closely control volume changes, means will be found to do that. Our past history indicates that we may justly expect that the limitations of yesterday have disappeared today and that the limitations of today will disappear in the mists of tomorrow.

Suggested Strength Specifications

(Continued from page 60)

troversial in character. Laboratories have made cylinders, have given them a short curing period under ideal conditions, and then have placed them on the slabs for the balance of the twenty-eight-day period, during freezing weather, with the evident intent of tying these cylinder tests to these particular slabs. Obviously the small cylinder would not properly reflect the conditions of the entire slab, because heat from some temporary source would have an entirely different effect on the mass.

Again, I have seen cylinders which showed the effects of different rodding, and I was not sure, at times, that the resulting cylinders correctly portrayed the stability of the structure.

Many times all the mechanics of proper control and maintenance of water ratio to insure strength may be dissipated by the improper placing of a chute which will produce segregation of the mass before it reaches the form.

May I council my audience that he who enters this field should carefully consider the type of contract he enters into. May I also express the hope that the existing agencies whose business it is to adopt standards find it expedient to establish methods of testing that remove, as far as possible, human errors. May I also suggest that tests should reflect, as far as possible, the true condition of concrete upon its arrival at the job, and that further tests should be made to determine the effects of curing and placing.

In conclusion, I may state emphatically that my experience has convinced me that a guaranteed product must have behind it the integrity of a reliable and responsible concern plus the endorsement of the national association, whose standards are unimpeachable, if our business is to be accepted as universally reliable.

Production of Crude Magnesite Down 31 Per Cent. in 1930

The total quantity of crude magnesite mined in the United States in 1930 was 129,320 short tons, with an approximate value of $1,033,130, according to reports furnished by producers to the U. S. Bureau of Mines. This represents a decrease of 31 per cent. from the quantity mined in 1929 (187,660 short tons).

Magnesite was mined and sold in California in 1930 by the Sampson Magnesite Co.. San Francisco, Cal., near Tres Pinos, San Benito County; Maltby Magnesite Co., Ltd., San Francisco, Cal., near Livermore, in Santa Clara County; California Magnesite Co., San Francisco, Cal., at Patterson, Stanislaus County; and the Sierra Magnesite Co., Ltd., San Francisco, working its newly acquired Bald Eagle mines in Stanislaus County, in addition to its mines near Porterville, Tulare County. The Northwest Magnesite Co., Chewelah, Stevens County, Wash., was the only magnesite producer in Washington in 1930.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

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SEWELL L. AVERY

President

United States Gypsum Co.

Chicago, Ill.

Coming Events

May 20, 1931. Fond du Lac, Wis. Fox River Valley safety conference. F. W. Hainer, sec., Fox River Valley & Lake Shore Safety Council, Fond du Lac, Wis.

May 21, 1931. Erie, Pa. Northwestern Pennsylvania safety conference. S. M. Lippincott, sec., Erie Safety Council, Erie, Pa.

May 21, 22, 1931. Columbus, O. Annual meeting, National Concrete Burial Vault Assn. J. H. Stuart, sec., Bremen, O.

June 3-4, 1931, White Sulphur Springs, W. Va. Thirteenth annual convention, National Lime Assn., New Greenbriar Hotel. N. G. Hough, president and general manager, 927 15th St., N. W., Washington, D. C.

June 8-12, 1931. White Sulphur Springs, W. Va. Annual convention National Fertilizer Assn., New Greenbriar Hotel. Charles J. Brand, executive secretary and treasurer, 616 Investment Bldg., Washington, D. C.

June 10, 1931. Buffalo, N. Y. Midyear meeting, Gypsum Assn., Statler Hotel. Henry J. Schweim, chief engineer, 211 W. Wacker Drive, Chicago, Ill.

June 11, 1931. St. Louis, Mo. Monthly meeting, St. Louis Quarrymen's Assn., Forest Park Hotel. E. J. McMahon, exec. sec., 4063 Forest Park Blvd., St. Louis, Mo.

June 15-18, 1931. Pittsburgh, Pa. International Cost Conference, National Assn. of Cost Accountants, William Penn Hotel. Stuart C. McLeod, secretary, New York, N. Y.

June 22-26, 1931, Chicago, Ill. Thirty-fourth annual meeting, American Society for Testing Materials. Stevens Hotel. R. E. Hess, asst. secy., 1315 Spruce St., Philadelphia, Pa.

October 12-16, 1931. Chicago, Ill. National Safety Congress. W. H. Cameron, secretary, National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These are printed in this column each issue.*

Fourteen Years Ago

THE Ottawa Sand & Gravel Co. of Ottawa, Ill., was spending $40,000 in replacing equipment at its plant.

* * *

Newly incorporated companies included the following: Martinsville Gravel Co., Martinsville, Ind.—H. H. Hicks, W. C. Meredith and M. M. Meredith, directors; Commercial Sand & Supply Co., Hutchinson, Kan.—C. W. Stamley, Chas. Mackey and A. E. Atkinson, incorporators; Moline Consumers Co., Portland, Ore.—James P. Pearson, president, Chas. C. Loptien, secretary.

* * *

The Petoskey Crushed Stone Co. of Petoskey, Mich., closed a contract with the Newaygo Cement Co. to supply 150,000 tons of limestone for cement manufacture.

* * *

Ten Years Ago

PHILIP T. KING, New York representative of the Ohio Locomotive Crane Co. and the Bedford Foundry & Machine Co., opened his own offices at 30 Church St., New York, to deal in cranes and other pit-and-quarry equipment.

* * *

The Illinois Concrete Aggregate Assn. announced the appointment of J. D. Pierce as executive secretary to fill the position vacated by the resignation of Ben Stone, who had acquired an aggregates plant in Indiana.

* * *

Five Years Ago

THE program of the eighth annual convention of the National Lime Assn., to be held at French Lick, Ind., June 8-11, 1926, was announced. Among the speakers were W. E. Carson, president of the Riverton Lime Co., G. J. Fink, research director of the association, and Irving G. Fellner, business manager, McGraw-Hill Publishing Co.

* * *

The Westfield Silica Co. began producing at its new silica-sand plant located near Westfield, Wis. V. E. Mitchell was general superintendent. The initial crushing capacity was 150 tons per hour.

* * *

The new cement and lime plants of the New England Portland Cement & Lime Co. located at Thomaston and Rockland, Me., respectively, were nearing completion and were scheduled to go into production early in the summer.

* * *

Quarry operators from seven states attended the meeting of the middlewest division of the National Crushed Stone Assn. at St. Louis. O. P. Chamberlain of Chicago presided. Talks were made by A. T. Goldbeck and J. R. Boyd of the association.

Edward A. Wright Forms Bag-Manufacturing Firm

Announcement is made of the formation of the Wright Bag Co., Inc., with office and plant located at 1 Main St., Brooklyn, N. Y. Officers are Edward A. Wright, president; George Reekie, vice-president and treasurer; John J. Walsh, secretary; and Adam A. Watson, production manager. All have had years of experience in the manufacture and marketing of bags, Mr. Wright having been connected with Bemis Bros. Bag Co. for over 18 years.

Electric Screen Company Formed at Indianapolis

The Indiana Electric Screen Co. of Indianapolis, recently organized by Otto Lay, 407 West Bernard St., and associates, plans operation shortly of a factory for the manufacture of screening equipment and wire cloth products.

Bates Valve Bag Co. to Build New Orleans Plant

The Bates Valve Bag Co., New York, subsidiary of the St. Regis Paper Co., has leased ground for a new one-story plant, to be erected at New Orleans, to cost over $150,000 with machinery. It is expected to have the unit ready for occupancy by August. Work was recently completed on another branch plant at Seattle.

Whitcomb Co. Properties Are Acquired by Baldwin

The Whitcomb Locomotive Co. has been formed by the Baldwin Locomotive Works of Philadelphia as a wholly-owned subsidiary to take title to the property of the George D. Whitcomb Co. which was recently sold at foreclosure. The new company is capitalized with 20,000 no-par common shares, all owned by Baldwin Locomotive, and is engaged in the production of industrial locomotives.

Hercules Has Exhibits at Chemical Exposition

Illustrated charts indicative of the places of Hercules products in the industries was the feature of the Hercules Powder Co. exhibit at the Chemical Exposition, held May 4 to 9, at New York, N. Y.

The manufacture of dynamite and gelatin dynamite was described by an illustrated flow sheet. Samples of ingredients were shown with sample cartridges of different explosives. These cartridges, of equal density, but of different size, pointed out the chemical control exercised in the manufacture of various type of explosives.

Personal Mention

R. H. MacFetridge, superintendent of the Tarrant plant of the Lehigh Portland Cement Co., Birmingham, Ala., is the new president of the Birmingham Safety Council. During the past year Mr. MacFetridge served as vice-president and as chairman of the Industrial Safety Committee. He came to Birmingham in 1922 to supervise the construction and operation of the Tarrant plant. Accident prevention work has been an important factor of his management. The Tarrant plant is a two-time winner of the Portland Cement Assn. safety trophy.

Elmer E. Way has been appointed advertising manager of the Taylor Instrument Companies, Rochester, N. Y.

M. B. MacNeille has resigned from Fairbanks, Morse & Co. and joined the Dayton-Dowd Co., manufacturers of centrifugal pumps, Quincy, Ill., and will act as western sales manager with headquarters in San Francisco.

Prior to his affiliation with the Dayton-Dowd company, Mr. MacNeille was for nineteen years connected with the pump division of Fairbanks, Morse & Co., in the capacities of designing engineer on centrifugal pumps, chief engineer of the hydraulic division and for the past six years, manager of the pump division.

Clarence Hawkins, manager of the Ouachita river plant of the Arkadelphia Sand & Gravel Co. made his first solo flight in an airplane after only three and one-half hours of instruction at Arkadelphia, Ark., recently. Mr. Hawkins used a monoplane which belonged to the Arkansas School of Aviation to make his first flight. He plans to purchase a plane of his own shortly.

Myron H. Wilson, of Cleveland, and **F. D. Kellogg,** president of the Ohio Cut Stone Co., also of Cleveland, were elected directors of the Indiana Limestone Co., it was announced by **A. E. Dickinson,** president. Mr. Kellogg succeeds Richard Inglis, and Mr. Wilson, former banker and for years associated with the stone industry, succeeds W. Edward Showers, Bloomington, Ind.

Frank Sedlecky has resigned as treasurer and manager of the Bellevue Stone Co. His son, Arthur, salesman for the company, Mrs. Kenneth Cargo, bookkeeper, and Kenneth Cargo, pattern-maker for the company, also resigned. The two families plan to move to Grand Rapids where they will organize and operate a crushed-stone plant.

A. J. Gerlaugh has acquired and is now operating a sand-and-gravel plant at Osborn, O.

Franklin P. Clark has joined the sales organization of the Wickwire Spencer Steel Co., Buffalo, N. Y., and will specialize in the promotion of wire-rope sales. Mr. Clark is a graduate of the Sheffield Scientific School

Franklin P. Clark.

of Yale and for the past five years was a sales engineer in Connecticut for the Good Roads Machinery Co., Inc. Previous to that, he was for two years a member of the Boston sales staff of the Wagner Electric Corp.

A. R. Kelso, factory manager of Continental Motors, Muskegon, Mich., has resigned. **V. M. Smith,** factory manager of the Detroit works, will take charge of both plants.

Cephus Williams, prominent coal and building-materials dealer of Streator, Ill., has acquired a sand-and-gravel deposit near that city and is constructing a plant on the site which is expected to begin producing shortly.

H. L. Dick, formerly sales engineer for Oliver-United Filters, Inc., in the middle-west territory with offices at 565 W. Washington St., Chicago, Ill., has been transferred to the company's eastern district with offices at 33 W. 42nd St., New York, N. Y. Mr. Dick will specialize in cement-plant installations in his new position.

R. S. MacPherran, chief chemist of the Allis-Chalmers Manufacturing Co., Milwaukee, has been awarded the J. H. Whiting gold medal for his many valuable contributions to the foundry industry. This medal is one of four awards made by the American Foundrymen's Assn. for the purpose of encouraging and stimulating, as well as recognizing meritorious achievements in the foundry industry.

Obituary

Silas T. Wilson, 31, vice-president and general manager of the Lexington Concrete Products Co., and chief engineer and director of the Central Rock Co., died April 30, at Frankfort, Ky., after a brief illness.

He was a graduate of Frankfort high school, a graduate in engineering of the University of Kentucky in 1922, member of the Sigma Chi fraternity, a ranking officer of the R. O. T. C., and a former city engineer of Frankfort. At one time Mr. Wilson was connected with the drafting division of the Kentucky state highway department.

Alfred Freeman Coats, 66, pioneer lumberman and Portland-cement manufacturer, died April 25th at a Seattle, Wash., hospital.

Mr. Coats went into the Northwest in 1886 from Michigan, settling in Aberdeen, Wash., where he organized several lumber and logging companies bearing his name. In 1908, Mr. Coats went to Seattle and became president of the Washington Portland Cement Co. with its plant located at Concrete, being the first cement plant in the Pacific Northwest. This later was merged with the present Superior Portland Cement Co. Mr. Coats was active in the promotion of good roads and while head of the cement company, donated the cement for one of the first concrete roads in that section—a highway in Skagit County. Surviving are his widow, three sons, George F., William R. and Alfred F. Jr., and three daughters, Mrs. Dorsey J. Elliott of Walla Walla and Ruth and Margaret of Seattle. A twin brother, Albert S. Coats, and two sisters also survive.

B. W. Ballou, president of the Haydite Co., Kansas City, Mo., died suddenly following a heart attack on April 21 at Pittsburgh.

Mr. Ballou was well known in the non-metallic mineral industries and, in addition to his activity in connection with the Haydite Co., he was vice-president of the American Aggregate Co. of Kansas City. He is survived by his widow and three daughters.

James W. Van Benthusen, employment manager of the Universal-Atlas Cement Co., died at his home in Chicago April 16. Burial took place at his birthplace, Marble Rock, Ia.

J. T. Foody, 49, vice-president of the Alfred Sand & Gravel Corp. of Alfred, N. Y., died at his home in Hornell, N. Y., April 11.

Correspondence

Scrap Obsolete Plants to Cut Over-Production

To the Editor:

There are two articles in the March 25 issue of your magazine to which I wish to call your attention in a critical manner.

First, the article by H. G. Wright in which he refers to "quick-hardening Portland cement retrograding after aging." Some years ago, before we really knew why the cement became quick-hardening or slow-hardening, Mr. Wright's statement might have been correct. Then we ordinarily increased the lime content in the cement beyond the point where it would be possible completely to combine it chemically in rotary kilns of a length of 200 ft. or less. Then, too, the tri-calcium compounds with the silica and alumina were not complete and firm, because of incomplete chemical action. This was due either to the fact that the kilns were too short, so that the material passed through the hot clinkering zone in too short a time and therefore did not complete a thorough chemical union of the tri-calcium compounds, or to an excess of lime, which could not be completely combined chemically on account of the short kilns and the passing of the material through the clinkering zone in too short a time, and thus formed an uncompleted compound or excess of free lime which would later partly disintegrate and cause a retrogression. With modern methods of manufacturing quick-hardening Portland cement, using kilns from 400 to 600 ft. long and large-diameter soaking zones, which hold the clinker in the white-hot or clinkering zone, it is possible for a complete chemical action to take place, permitting the maximum and theoretical amount of lime required to combine in a ratio of three atoms of lime to one atom of either silica or alumina in a fixed chemical compound. No retrogression whatsoever takes place in a cement made under such modern conditions. With the tri-calciums increased, so that the tri-calcium silicate plus tri-calcium aluminate forms approximately 80 per cent of the total of the clinker, the remainder being largely a calcium-ferro-aluminate compound which assists the quick-hardening properties, the finished cement will have a strength which is not only equal, in 24 hr., to that of the old-style Portland cement in 30 days but also continues to increase for an indefinite period of time and without any retrogression whatsoever.

The second article, by Blaine S. Smith, gives a chart setting forth the fact that the output of Portland cement has increased during the past few years much more rapidly than the consumption. We will grant this point by Mr. Smith, that consumption has not kept pace with the total output of Portland-cement plants, but, as president of a large cement company, he certainly knows that the bulk of the increased output is from new plants, modernly equipped with the very latest machinery. When I refer to the very latest machinery I mean kilns over 400 and up to 600 ft. in length; the latest grinding units, using the closed-circuit system on both the dry- and wet-grinding sides; equipment making the plant dust-proof; and a pumping system, in lieu of elevators and conveyors, for transporting the fine ground cement. Such a plant, with kilns having large-diameter soaking zones wherein the heavy load of clinker at the white-hot peak or fusion point is held back for a much longer time than in the ordinary straight kilns—thus permitting the theoretical amount of lime to be added and making possible a complete combination of the lime into tri-calcium silicate, tri-calcium aluminate, or calcium-ferro-aluminate—will produce a quick-hardening Portland cement, the strength of which will be as great in 24 hr. as that of ordinary Portland cement in 30 days. It can readily be understood why there has been a demand for a product of so much better quality and which is readily marketable, regardless of how many old-style plants are marketing their products.

An article in PIT AND QUARRY of March 11 refers to the Keystone Portland Cement Co., which built a quick-hardening-cement plant a few years ago. After a few months' operation, it increased the output from 3,300 to 6,600 bbl., and has now decided to increase its capacity still more—all this in spite of the fact that the plant was built in the heart of the Lehigh Valley where there are more plants in a radius of 20 miles than in any other section of the United States. Last year the International people installed a plant in Pennsylvania because their plant in Indiana was no longer able to supply the demand for the quick-hardening product, "Incor." I understand the same company has recently installed a 406-ft. kiln at the New Orleans plant, thereby replacing its smaller kilns. I also understand that it is about to install two 450-ft. kilns at the Houston, Tex., plant and one 450-ft. kiln in Dallas, Tex., these kilns to displace all the smaller units.

We are about to install, here in southern California, a plant that will use two kilns 11 ft. 3 in. in diameter and 600 ft. long, with double 15-ft. soaking zones, and two kilns, 8 ft. in diameter and 600 ft. long, with 11-ft. 3-in. double soaking zones, for burning quick-hardening white Portland cement and commercial lime. One of these kilns will operate at a capacity of approximately 5,000 bbl. per day. The consumption of fuel will be about one-half that of kilns 200 ft. or less in length. The waste gases from the back ends of the kilns will have a temperature of less than 500 deg. F., making it possible, at a small expense, to cool and purify them and to recover the CO_2 in solid form as a by-product. These long kilns, with soaking zones, therefore have a triple effect, to-wit: they make it possible to manufacture quick-hardening Portland cement with a stable combination of the two tri-calcium compounds; they effect a reduction in the cost of fuel; and they make it practical to manufacture gas ice as a by-product.

Mr. Smith fails to take into consideration the fact that the "transition" period in the manufacture of Portland cement is now present and, in my opinion, will, within the next five years, repeat the situation that occurred during the 1890's. At that time another transition took place and many millions of dollars of capital, invested in the natural-cement industry, were wiped out, because of the fact that Portland-cement plants, built at that time, supplied a very superior product, which was generally accepted or adopted by the engineering profession throughout the United States, as well as societies governing standard specifications for the use of cement. Quick-hardening Portland cements, which have already been generally accepted throughout Europe, are fast taking the place of ordinary Portland cement in the United States. Practically all the new plants being built are designed for the manufacture of quick-hardening Portland cement. The result is bound to be the same as it was in the 1890's; a superior-quality cement is bound to displace the inferior-quality, ordinary, Portland cement. Unless existing plants are practically rebuilt with modern equipment, including long kilns and large closed-circuit grinding units, they will become useless and fit only for the scrap pile. It is a question of survival of the fittest, and in this instance the new quick-hardening Portland-cement plants, built with modern equipment, are the fittest. While the old, worn-out junk piles are still listed as possible producers, it is merely a matter of time until they will have been forced to cease operation and will be wrecked and wiped out by the junkman.

Many of these old plants in the past years have been consolidating, through new financing with heavy bond issues and big stock issues floated and passed on to the "dear public." In many instances the original builders of the plants had received their original investment back many times during the past twenty or thirty years and were intelligent enough to know that, unless practically new plants were built, they would be unable to keep pace with modern plants, either in cost of production or in quality of product. They were wise

enough to sell out, and the new owner, usually accommodating the brokers and promoters, obtained control of the voting stock of the new consolidated companies with very little, if any, investment in the plants. A past earning record of many years made flotation of securities very easy for the brokers, as the securities stood the acid test by showing a long continuous dividend-paying record. In my opinion, there is bound to be a tremendous loss in these securities and many of them already have their bonds far below par and their stock issues still lower. In many instances the financing has been floated on a basis wherein the securities sold amounted to much more than the actual cost of replacing the plants. Therefore there would be no margin left for new financing with which to modernize the old plants or to build new plants. The result under such conditions will be a total loss in the end to the buyers of these securities.

CEMENT ENGR. CO.
Aman Moore, *Pres.*

Los Angeles, Cal.

To the Editor:

The paragraphs to which Mr. Moore refers do not mention "quick-hardening cement" but refer to high-early-strength cements. The writer fails to grasp the connection between Mr. Moore's lecture on the chemistry of burning and the paragraphs referred to, as they simply state an opinion relative to the permanence of high-early-strength cements in general. The high-early-strength cements certainly have not been in use long enough to allow of a comparison with standard Portland cements over years of service.

HARDINGE CO., INC.
York, Pa.
H. G. Wright, *Research Engineer, Cement Machinery Division.*

Roller-Bearing Crushers vs. Sleeve-Bearing Types

To the Editor:

Unfortunately, the figures for the sleeve-bearing crusher given in Mr. West's article [PIT AND QUARRY, Jan. 14, 1931, pp. 61-64] were only hearsay; that is, they were the estimate of the operator. The figures on our own crusher were taken by an electrician, and the plant operator estimated the production. It is significant that the previous installation used a 50-hp. motor which, we were assured by the operator, was necessary.

The test machine is still in service and, as far as I know, giving thoroughly satisfactory service on the same type of material. We have since made numerous tests on this and other sizes of crushers and find that, while the power consumed by the roller-bearing crusher is less than that used by a corresponding sleeve-bearing machine, there does not seem to be as great a difference as the original figures would indicate. We make our saving principally on starting load and on the ability to run at higher speed without heating.

I can not give you figures on crushers running side by side in the same plant making the same size product; the only figures I have are on our own machines separately or on sleeve-bearing machines separately. While there is no doubt that these figures are not exactly comparable, I find that generally the roller-bearing crusher is using less power than the general run of sleeve-bearing crushers for similar material.

ALLOY STEEL & METALS CO.
Los Angeles, Cal. P. R. Francis, *Ch. Engr.*

The Value of the Diamond Core Drill in Prospecting Deposits

IN numerous engineering and mining lines of prospecting it has been necessary to secure more particulars regarding the structures and compositions of undercover deposits of rocks or minerals "in place" than could be obtained through any sort of drilling that chips or disintegrates all the material which it removes. In metal-mine prospecting there is a demand for information concerning not only the metallic value and the chemical content of the drillings but generally and more insistently for actual cross-sections of the measures penetrated.

The core drill was invented to meet these requirements. The universal success of core drilling has caused its adoption in civil engineering and, of late years, in the exploitation of non-metallic rocks. While several distinct types of core drills have been invented, practical usage has gradually centered upon that type in which diamonds are employed to do the actual cutting. In a diamond drill, a power unit mounted at the collar of the hole rotates a hollow shaft, to the bottom end of which is threaded an annular bit. This bit is set with a number of diamonds in such an arrangement that, as the string of tools rotates, these stones wear a ring-shaped cavity in the rock, leaving a solid central amount of the rock intact as a core which slowly passes upward inside the hollow shafting or barrel. For most drill holes of moderate diameter, the bit requires eight stones. The selection and setting of the stones must be done by an expert.

Industrial diamonds are divided into two distinct groups, carbons or black diamonds and Bortz which are true crystalline diamonds. Although diamonds are found in many parts of the world, Brazil is the only source known to produce carbon in commercial quantities. Carbon is opaque. It is found in various colors: black, dark green, brown, and gray. Most stones, however, have a lustrous black surface. They range in size from a quarter of a carat to several hundred carats each. Large stones must be split into marketable shapes and sizes, necessitating expert skill.

The inner faces of freshly broken carbon show light gray in color and resemble close-grained steel. The broken surface gradually oxidizes when exposed and finally assumes a dark ash-gray color. Carbon, being amorphous and non-crystalline, differs greatly from the white diamond. It has no planes of cleavage and is therefore less liable to fracture, which lends it greater value for industrial purposes, especially where resistance and quick-cutting qualities are essential.

Before the introduction of the diamond drill, carbon was sold for a few dollars per carat. It was shipped to Europe, where it was crushed into powder and sold to lapidaries for cutting and polishing brilliants and semi-precious stones.

Carbon is finding favor in many industries where hitherto only bortz (which are true crystalline diamonds) were used, the reason being that carbon, being homogeneous throughout, is tough and less brittle. These qualities cause it to wear gradually until entirely consumed, whereas bortz quickly crumbles once the surface, the hardest part of the stone, is ground away. Carbon also lends itself to "shaping" better than bortz and can, therefore, be ground to any angle.

Drillers employ various sizes of stones ranging from one-half to eight carats each, the most favored sizes ranging from two to six carats. It is generally conceded that the larger sizes are most economical, not only because they withstand hard usage relatively better than the smaller stones but also because they are less difficult to set and less liable to become dislodged while in use.

Many operators have found it expedient to diamond drill their entire properties. In practically every instance the diamond drill can be depended upon to give accurate and scientific information, confirming or refuting theories of the engineer.

The Diamond Drill Carbon Co., 55 Park Row, New York, one of the well-known firms specializing in the importation and sale of industrial diamonds, will send, upon request, a 32-page booklet which contains valuable information on this subject.

Appoints Distributors of Quarrying Equipment

The Gardner-Denver Co. has recently appointed the Wm. T. Walsh Equipment Co., Cleveland, O.; the Virginia Tractor Co., Inc., Richmond, Va., and C. F. Rabbeit, Inc., of St. Louis, as distributors for the Gardner-Denver line of portable air compressors, rock drills, and other equipment for the quarrying and construction industries.

Traffic News and Comment

Recent I. C. C. Decisions

Cement—The commission has found that the intrastate rates on cement from Louisville, Neb., to Omaha, Neb., and intermediate points are unduly preferential to Louisville and to intrastate traffic from that point and unduly prejudicial to complainants and unduly discriminatory against interstate traffic from Iowa producing points. It has further found that Scale 2 rates prescribed in the Western Cement Rates case would be reasonable for application from the complainant cement-producing points to Omaha and to points intermediate thereto in respect of Louisville as an origin point; and that when, and to the extent that, the intrastate rates from Louisville to such destinations were lower, distance considered, than rates constructed under Scale 2, they were unduly preferential to the shipper at Louisville and its traffic and unduly prejudicial to the complainants' plants in Iowa, and their traffic, and unjustly discriminatory against interstate commerce, and that the undue preference and unjust discrimination should be removed by the establishment of intrastate rates on a basis not lower than Scale 2 rates. I. C. C. Docket No. 22,691, Dewey Portland Cement Co. *et al.* v. A. T. & S. F. *et al.* In connection with the above report the Commission has dismissed the following complaints: No. 22,691, Sub. 1, Same v. C. R. & I. C. *et al.;* No. 22,780, Lehigh Portland Cement Co. *et al.* v. Same; and No. 22,184, State Cement Commission of South Dakota v. A. T. & S. F. *et al.*

Coated Crushed Stone or Slag—The commission has prescribed a mileage scale of rates on coated crushed stone or slag which will be reasonable from Shaw Jct. and Youngstown, Pa., and competing points in Ohio to destinations in New York, Ohio, Pennsylvania, and West Virginia. In its report the commission stated: "We find that the rates assailed from Youngstown and Shaw Jct., to points in Pennsylvania and New York, on and west of an imaginary line extending north and south through Cresson, Pa., and in Ohio and West Virginia, are, and for the future will be, unjust and unreasonable to the extent that they exceed the rates shown below:

Distance (Miles)	Single	Joint
20	$0.73	$0.88
40	.83	.98
60	.93	1.08
80	1.03	1.18
100	1.13	1.28
125	1.23	1.37
150	1.33	1.46
175	1.43	1.55
200	1.53	1.64
225	1.61	1.71
250	1.68	1.77

"In computing distances for the application of the foregoing scale, the shortest routes over which carload traffic can be moved without transfer of lading should be used. We further find that the circumstances and conditions surrounding the intrastate transportation of coated stone from Kenton, Youngstown, Marble Cliff and West Columbus to points in Ohio, on and east of an imaginary line drawn north and south through Marion, are substantially similar to those surrounding the interstate transportation of like traffic from Shaw Jct. to those points; that the rates set forth in the preceding table are and will be maximum reasonable rates from and to these points; and that the intrastate rates on coated stone from and to the aforesaid points, except for distances under 20 miles, are, and for the future will be, unduly preferential of the Ohio producers at Kenton, Youngstown, Marble Cliff and West Columbus and unduly prejudicial to the complainant to the extent that they are or may be lower, distance considered, than the rates set forth in the preceding table contemporaneously in effect to the same points from Shaw Jct. The allegation of unjust discrimination against interstate commerce has not been sustained. I. C. C. Docket No. 22,598, Interstate Amiesite Co. v. A. C. & Y. *et al.*

Ground Limestone—The commission has prescribed a mileage scale of rates on ground limestone from Shaw Jct., Pa., to destinations in New York, Pennsylvania, Maryland and West Virginia, on and west of a line connecting Olean, N. Y., Cresson, Pa., and Cumberland, Md., and have found that the rates were, and for the future would be, just and unreasonable to the extent that they exceeded or might exceed this scale and that their relation to rates on the same commodity from Buffalo, N. Y., Gibsonburg, O., Greer, W. Va., and points in the Bellefonte, Pa., and Martinsburg, W. Va., districts to the same destination territory were unduly prejudicial to the complainants and unduly preferential to their competitors at the other producing points mentioned. Reparation has been awarded on shipments made since Jan. 10, 1930, and the new rates are to be made effective not later than July 27. In computing the distances, the shortest distances over which the traffic can move without transfer of lading are to be used. The rates at various intervals on the scale are shown below. I. C. C. Docket No. 23,068, New Castle Lime & Stone Co. *et al.* v. Aliquippa & Southern *et al.*

Distance (Miles)	Single Line	Joint
5	$0.60	$0.80
50	1.00	1.20
100	1.35	1.50
200	1.85	1.85
300	2.25	2.25

Lime—The commission has found the rates on lime from Engle, W. Va., to Charlottesville and Hampton, Va., unreasonable to the extent they exceeded $2.90 and $3.50 a net ton respectively. They have further found that the rates of $3.37 and $3.40 a net ton on shipments to Portsmouth, Va., were inapplicable over the routes of movement; that the applicable rate over the route of movement was $5.30; that the shipments were misrouted by the B. & O.; that the applicable rate over the route over which the shipments should have moved was $3.40 plus $4.00 a car and that that was unreasonable to the extent that it exceeded $3.50. It found further that the rate of $3.96 charged on shipments to Virginia Beach, Va., was inapplicable over the route of movement; that the applicable rate over the route of movement was $6.20; that the applicable rate over the route the shipment should have moved was $3.96 and that the rate was unreasonable to the extent that it exceeded $3.90. All rates are expressed in net tons. Reparation was awarded I. C. C. Docket No. 23,281, Washington Building Lime Co. v. B. & O. *et al.*

Fourth-Section Applications

Cement—F. A. Leland has requested fourth-section relief in connection with the establishment of rates on cement from points in Ohio, Indiana, Illinois, Minnesota, and Nebraska, to points in Arkansas, Louisiana, Missouri, and Texas. Appl. No. 14,358.

E. B. Boyd has requested fourth-section relief in connection with the establishment of rates on cement from Portland and Boettcher, Colo., and Laramie, Wyo., to points in Colorado and Wyoming. Appl. No. 14,361.

Rate-Committee Dockets

Weighing Rules

The various rate committees have docketed the subject of weighing rules, and a uniform set of rules has been adopted by the weighing committee of the American Railway Assn., which will be considered on these dockets. It is desired to have the weighing rules in all the tariffs of all the carriers throughout the country uniform. The rules which may affect the nonmetallic-minerals industry are: (A) Tolerance Rule: The tolerance shall be 1 per cent. of the lading with a minimum of 500 lb. on all car-load freight except that, when ashes, coal, coke, cinders, clay, dolomite, ganister, gravel, mill scale, ore, sand, slag, all stone (not cut), brick, soft drain tile, and borings, filings or turnings (metal) are loaded in open cars, the tolerance shall be 1½ per cent. of the lading with a minimum of 500 lb.

New England Freight Assn.

Sand and Gravel—To meet motor-truck and barge-line competition, it is proposed to reduce the rate on sand and gravel car-load minimum weight 90 per cent. of the marked capacity of the car except when the combined weight of the car and the load exceeds the published maximum-weight limits, in which case the minimum weight will be the maximum weight that can be transported via the direct route to destination point without exceeding the maximum-weight limit, from New Haven, Conn., to White Plains, N. Y., from $1.90 to 85 cents a net ton. Docket No. 22,431.

Talc—It is proposed to cancel the present commodity rates on talc, car-load minimum weight 36,000 lb., which exceed the sixth-class rates, from Rochester, Bethel, Braintree, E. Granville, Middlesex and Waterbury, Vt., to North Brookfield, Webster and Worcester, Mass., as named in C. V. Ry. I.C.C. A-5,745 and apply in lieu thereof sixth-class rates published in B. & A. I.C.C. 8,514. Docket No. 22,-422.

Trunk Line Assn.

Cement—Shippers have asked for the publication of a rate of 14 cents per 100 lb. on cement in shipping containers loaded on container cars, car-load minimum weight 120,000 lb. from Alsen and Binnewater, N. Y., to White Plains, N. Y. This is to include the transfer of the containers only from the car to the truck at destination. Docket No. M-1,726.

Carriers propose to revise the car-load minimum weights on cement from the Lehigh district to New York, subject to the rate of 10 cents per 100 lb., to be as follows: 50,000 lb. in barrels; 60,000 lb. in bags; 60,000 lb. in mixed car-load in bags or in barrels. Docket No. M-1,729.

Carriers propose to establish rates on cement from all producing points in Trunk Line Assn. territory to destinations on the F. J. & G. R. R., by use of the following arbitraries over Fonda. Rates shown in cents per 100 lb. Docket No. M-1,737.

To	Cents
Johnstown	2½
Gloversville	3
Broadalbin	4
Vails Mills	4

Crushed Stone—To meet motor-truck competition it is proposed to reduce the rate on crushed stone, car-load minimum weight[1], from West Paterson, N. J., to Secaucus, N. J., to 50 cents a net ton, rate to expire Dec. 31, 1931. Docket No. M-1,738.

Central Freight Assn.

Agricultural Lime—Shippers at Scioto, O., have asked for reduced rates on agricultural lime, car-load minimum weight 30,000 lb., to various stations in Ohio in Docket No. 28,279, as follows:

To	Present	Proposed
Bayard	$0.15	$0.10½
Cannelville	.12	.09½
Carbondale	.13	.10
Carrothers	.11	.08
Castalia	.12½	.09
Clare	.13½	.10
Dover	.13½	.10½
Drakes	.12	.09½
Falls Jct.	.14	.10
Galatea	.11	.08½
Hamden	.12½	.09½
Hamler	.12	.09
Hobson	.14	.10½
Hopedale	.15	.11
Jeffersonville	.12	.09
Killbuck	.12½	.09
Kingman	.14	.09½
Lordstown	.14	.09½
Maple Grove	.12	.08½
Middletown Jct.	.12½	.09½
Mortimer	.11	.08½
New Pittsburg	.12½	.09½
Sedalia	.14	.11
Slater	.10½	.08½
Tontogany	.12½	.09

Lime—Carriers propose to establish a rate of 11 cents per 100 lb. on lime, car-load minimum weight 60,000 lb., from Mitchell, Ind., to Decatur and Springfield, Ill. The present rate of 14 cents on a car-load minimum weight of 30,000 lb., will be continued in effect. Docket No. 28,240.

Shippers propose the establishment of a rate on lime, car-load minimum weight 50,000 lb., (subject to rules of the Southern Classification) from Genoa, O., to New Orleans, La., of 31 cents. The present rate is 32 cents, car-load minimum weight 30,000 lb., per C. F. A. Tariff 15-Q. Docket No. 28,308.

Crushed Gravel—Carriers propose to amend commodity description of Item 1,330 of C. F. A. Tariff 130-T, naming 83.33 per cent of sixth class rating on crushed gravel in bags, minimum weight 50,000 lb., from points in C. F. A. territory to points in Canada, to read as follows: "Gravel, crushed, in bags or in bulk, in box cars, minimum weight 50,000 lb." Docket No. 28,302.

Illinois Freight Assn.

Cement—It is proposed to reduce the proportional rates on cement from Cairo, Ill., applicable only on traffic originating at Birmingham, North Birmingham, Boyles and Phoenixville, Ala. Present and proposed rates in Docket No. 5,215-A, are, in cents per 100 lb.:

To	Present	Proposed
St. Paul, Minn.	33½	23
Minneapolis, Minn.	33½	23
Northfield, Minn.	33½	23
Duluth, Minn.	35	23
Marquette, Minn.	35	23

Western Trunk Line Committee

Roasted Dolomite—Shippers propose a reduction in the rate on roasted dolomite, car-load minimum weight marked capacity of car except when car is loaded to full visible capacity actual weight will apply but not less than 40,000 lb. from St. Louis, Mo., East St. Louis and Granite City, Ill., to Kansas City, Mo.-Kan., from $2.90 to $2.50 per net ton. Docket No. 1,241-A.

Sand and Gravel—Reduced rates on sand and gravel, car-load minimum weight marked capacity of car or visible capacity if less, based on No. 21,-755 Scale, are proposed to apply from Chillicothe, Ill., to stations on the A. T. & S. F. in Iowa and Missouri. Representative rates are shown below. Docket No. 4,742-J.

To	Miles	Present	Proposed
New Boston, Ia.	113	$1.60	$1.15
Dumas, Mo.	122	1.60	1.20
Medill, Mo.	133	1.60	1.25
Hurdland, Mo.	170	1.60	1.40
La Plata, Mo.	182	1.60	1.45

Southern Freight Assn.

Crushed Stone, Sand and Gravel—It is proposed to establish rates on crushed stone, sand and gravel, from Haile, Kendrick, Lary and Willston, Fla., to points in South Georgia and North Florida, on the basis of Docket 17,517 Joint-Line Scale without the addition of the Florida arbitrary. Docket No. 54,890.

Traffic News

Fiber Wall Board Assn., Celotex Co., Stewart Inso Board Corp., Masonite Corp., and Upson Co. have been permitted to intervene in I. C. C. Docket No. 23,823, Gypsum Assn. *et al.* v. A. T. & S. F. *et al.*, and have asked for dismissal of the complaint.

McGrath Sand & Gravel Co., Joliet Gravel Co. and Morton Sand & Gravel Co. have been permitted to intervene in I. C. C. Docket No. 24,099, Missouri Gravel Co. v. C. B. & Q. *et al.*

Eastern Trunk Lines, defendants, ask reconsideration of report rendered and for modification of the order in I. C. C. Docket No. 22,771, (Sub 1), Falling Spring Lime Co. v. P. R. R. *et al.*

Colorado Portland Cement Co., intervener, asks reconsideration and re-argument, and the U. P. and D. & R. G. W., defendants, ask rehearing and reconsideration of report and order, dated Feb. 14, 1931, and postponement of effective date of rates prescribed pending rehearing, in I. C. C. Docket No. 22,020, Iola Cement Mills Traffic Assn. *et al.* v. A. T. & S. F. *et al.*

E. B. Boyd, agent for carriers parties to the order, asks postponement of the effective date of the order in I. C. C. Docket No. 22,020, Iola Cement Mills Traffic Assn. v. A. T. & S. F. *et al.*

Defendants in I. C. C. Docket No. 21,323, Dann Gerow Co., Inc., *et al.* v. A. C. L. *et al.*, ask postponement of the effective date of the order, and reopening and reargument before the entire commission.

Defendants in I. C. C. Docket No. 22,771, Falling Spring Lime Co. v. C. & O. *et al.*, ask modification of order entered Feb. 26.

Manganese Steel Forge Moves Chicago Offices

The Manganese Steel Forge Co. of Philadelphia, Pa., recently moved its Chicago district offices from Suite 716 to Suite 756 in the Builders' Building, Chicago, Ill. W. H. Potter continues in charge of sales for this district.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Salt Company's Profits Show Hopeful Increase

Following a meeting of directors of International Salt Co., Mortimer B. Fuller, president, stated that profits of the company during the first quarter of 1931 exceeded by about 33 per cent. those of the corresponding period last year, which was the best quarter for the company in many years.

April business, Mr. Fuller continued, has maintained about the same rate of gain as in the first three months, and apparently the company stands to realize a good first six months. International Salt does not issue quarterly statements. In the six months ended June 30, 1930, the company reported profit of $322,901 after charges, etc., but before federal taxes. Capital stock outstanding on March 31, 1931, amounted to 240,000 shares (par $100).

British Cement Combine Reports Higher Income

The report of Associated Portland Cement Manufacturers, Ltd., of London, England, for year ended December 31, 1930, shows net profit of £387,649 (approximately $1,885,000) after taxes, debenture interest, depreciation and provision for its debenture stock-redemption fund, equivalent after dividend requirements on 5½-per cent preference stock to 8.66 per cent on £3,000,000 ordinary stock.

This compares with £367,515 (approximately $1,790,000), or 7.99 per cent on ordinary stock in 1929.

Pennsylvania-Dixie Has Higher Earnings Ratio

Pennsylvania-Dixie Cement Corp. reports for the twelve months ended March 31, 1931, net income of $467,202 after depreciation, depletion, interest and federal taxes, equivalent to $3.44 a share on 135,888 shares of 7-per cent preferred stock. This compares with $329,136 or $2.42 a share on preferred for the twelve months ended March 31, 1930.

Consolidated income account for twelve months ended March 31, 1931, compares as follows:

	1931	1930
Operating profit	$2,594,627	$2,479,723
Depreciation & depletion	1,381,716	1,393 314
Interest	657,754	700,285
Federal taxes	87,955	56,988
Net profit	$467,202	$329,136

Consolidated balance sheet of Pennsylvania-Dixie Cement Corp. and subsidiaries as of March 31, 1931, compares as follows:

Assets

	1931	1930
†Land, bldgs., mach. & equpt.	$23,999,732	$24,987,226
Cash	2,189,885	1,851,841
Short term securities	552,000	.....
Notes and accounts receivable	633,392	654,789
Inventories	3,055,380	3,135,590
Miscellaneous investments	344,547	427,910
Insurance fund, etc.	186,409	129,740
Deferred charges	40,646	33,153
Total	$31,001,991	$31,220,249

Liabilities

Preferred stock	$13,588,800	$13,588,803
*Common stock	4,000,000	4,000,000
Gold bonds	10,630,000	11,353,000
Accounts payable	145,760	222,853
Accrued taxes, interest, etc.	135,293	166,652
Federal-tax reserves	117,624	70,143
Other reserves	92,208	93,972
Surplus	2,292,306	1,724,829
Total	$31,001,991	$31,220,249

* Represented by 400,000 no-par shares.
† After depreciation and depletion.

At the annual stockholders' meeting of the Pennsylvania-Dixie Cement Corp., Blaine S. Smith, president, told stockholders that unfilled orders as of April 1, 1931, were about the same as a year ago, with bookings showing an upward tendency.

"Due to over-capacity in the cement industry and consequent exceedingly keen competition," Mr. Smith said, "selling costs continue much too high. Our selling and administrative expense in 1930 was $102,460 less than in 1929, which followed a reduction of $145,507 in 1929 below the 1928 total."

Canadian Crushed-Stone Producer's Income Lower

Dufferin Paving & Crushed Stone, Ltd., reports for the year ended December 31, 1930, net income after depreciation, income tax provision and special write-off of $60,000 from investments, of $230,169, equal after preferred dividends, to 36 cents a share on 60,000 shares no-par common stock, against $388,593, or $2.97 a common share in 1929.

International Cement's Net Drops 50 Per Cent.

International Cement Corp. reports for the quarter ended March 31, 1931, net income of $410,909 after depreciation, federal taxes, etc., equivalent to 65 cents a share on 636,085 shares of no-par common stock. This compares with $841,480 or $1.34 a share on 628,883 shares in first quarter of 1930.

Income account for quarter ended March 31, 1931, compares as follows:

	1931	1930
Gross sales	$6,111,424	$7,239,744
Exp., etc.	4,878,748	5,506,287
Depreciation	467,626	491,037
Net	$ 765,050	$1,242,420
Int., tax, etc	354,141	400,940
Net income	$ 410,909	$ 841,480

Holger Struckmann, president, reports that earnings of the domestic subsidiaries were greater than for the first quarter of 1930. The net decline in earnings compared to last year, he declares, is due to the extremely depressed conditions in Cuba and to increased exchange losses in South American countries.

CURRENT DIVIDENDS

Company	Class of Stock	Dividend Rate	Holders of Record	Payable
Alpha Portland Cement	Common	$0.25 qr.	Apr. 1	Apr. 25
Bessemer Limestone & Cement	Class A	$0.75 qr.	Apr. 20	May 1
Calaveras Cement Co.	Preferred	$1.75 qr.	Mar. 31	Apr. 15
Cleveland Quarries	Common	$0.75 qr.	May 15	June 1
Dolese & Shepard	Common	$1.00 qr.	Mar. 20	Apr. 1
Dufferin Paving & Crushed Stone	Preferred	$1.75 qr.	Mar. 20	Apr. 1
Fitzsimons & Connell	Preferred	$1.75 qr.	Mar. 21	Apr. 1
Fitzsimons & Connell	Common	$0.50 qr.	May 21	June 1
Great Lakes Dredge & Dock	Common	$0.25 qr.	May 5	May 15
Gypsum, Lime & Alabastine, Ltd	Common	$0.20 qr.	Mar. 28	Apr. 1
Johns-Manville	Preferred	$1.75 qr.	Mar. 11	Apr. 1
Johns-Manville	Common	$0.75 qr.	Mar. 25	Apr. 15
Lehigh Portland Cement	Preferred	$1.75 qr.	Mar. 14	Apr. 1
Lehigh Portland Cement	Common	$0.25 qr.	Apr. 14	May 1
Medusa Portland Cement	Preferred	$1.50 qr.	Mar. 25	Apr. 1
Medusa Portland Cement	Common	$0.75 qr.	Mar. 25	Apr. 1
Mineral Products	Class B	$0.17½qr.	Apr. 30	May 1
National Gypsum	Preferred	$1.00 qr.	Mar. 20	Apr. 1
Newayo Portland Cement	Preferred	$1.75 qr.	Mar. 25	Apr. 1
New York Trap Rock	Preferred	$1.75 qr.	Mar. 20	Apr. 1
Pacific Portland Cement	Preferred	$1.62½ qr.	Mar. 31	Apr. 4
Pennsylvania Salt	Common	$0.75 qr.	Mar. 31	Apr. 15
Raymond Concrete Pile	Preferred	$0.75 qr.	Apr. 20	May 1
Raymond Concrete Pile	Common	$0.50 qr.	Apr. 20	May 1
Santa Cruz Portland Cement	Common	$1.00 qr.	Mar. 21	Apr. 1
Standard Paving & Materials	Preferred	$0.50 qr.	Apr. 23	May 1
Standard Paving & Materials	Common	$1.75 qr.	Apr. 30	May 15
Superior Portland Cement	Class A	$0.27½ M	Apr. 30	May 15
Wallace Sandstone	Preferred	$1.50 S.A.	Mar. 30	Apr. 15
Warner Company	Common	$0.50 qr.	Mar. 31	Apr. 15
Warner Company	1st Pfd.	$1.75 qr.	Mar. 14	Apr. 1
Warner Company	2nd Pfd.	$1.75 qr.	Mar. 14	Apr. 1

Review of Foreign Practice

Recent Improvements in Ball-Mill Construction

There was a great diversity of opinion concerning the grinding process in the ball mill until a leading manufacturer instituted extensive researches, which were supervised and evaluated by Dr.-Ing. H. C. Hermann Fischer, who has in the meantime died. These researches showed that when the trommel is rotated slowly the material and the steel balls rise and slide back along

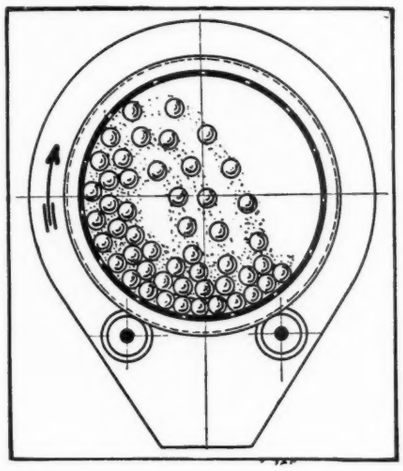


Fig. 1. In average operation the balls are lifted to the upper third of the barrel by the rotation of the mill and fall back because of their weight.

the shell wall, and there is scarcely any grinding action. With moderate rotation, the balls follow the course indicated in Fig. 1; because of the peripheral speed they rise high on the shell wall to the upper third of the circumference and fall back because of their specific gravity, carrying with them in a continuous stream the material to be ground, which they abrade and break down. In this process the material is uniformly distributed over the whole width of the barrel, as the fine particles tend to fill up the spaces between the balls.

If this ideal speed of rotation is exceeded, the centrifugal force holds the grinding elements and the charge fast against the shell, forming a solid mantle with only a slight grinding action.

The results of the investigations were still further amplified in practical work. The most important data on ball mills as they are found in use

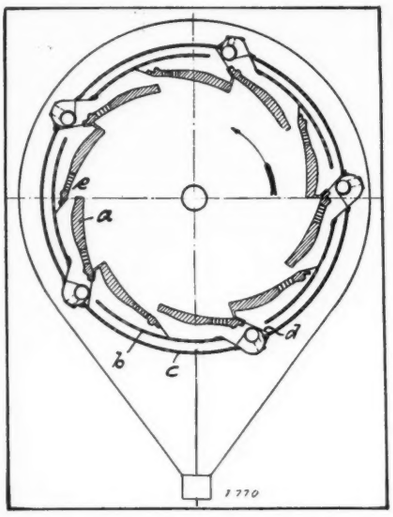


Fig. 2. In a mill of this construction the unground material is removed through discharge openings when direction of rotation is reversed.

today are given in the accompanying table.

The capacity varies with the hardness of the material and with the feed. Above all, the material must not pile up in the feed opening, as capacity is considerably reduced by overfilling. A practical guide for good operation of the mill is that the noise of the balls should always be distinctly heard.

While in older types of ball mills the unground residue must be removed from the barrel by hand, in mills of the construction shown in Fig. 2 this is accomplished by reversing the direction of rotation, so that the unground material escapes from the mill through discharge openings. The grinding plates (*a*) are surrounded by two screening devices, the coarse screen (*b*) and the fine screen (*c*). The projected plates (*d*) divide the coarse screening space into compartments, which are in connection with the grinding chamber by means of slots in the grinding plates. When at the end of a run of the mill the barrel is rotated in the opposite direction, the chambers are filled through the interstices (*e*) and deliver the residue to the discharge openings.

In the modern mills the throughgoing driving shaft is avoided; its place is taken by short bearing trunnions, which are hollow for the feeding and discharging of the mill. Such a hollow trunnion is shown in Fig. 3. On the driving shaft (*a*) is a heavy hub (*b*), which is screwed to the central piece (*d*). The other side of (*b*) is attached to the forward wall of the mill. The central piece (*d*) carries four scoops (*e*) which pick up the feed material and deliver it through openings in the circumference of the trunnion, where it is advanced through the cone (*f*.) The material is introduced into the mill through the spout (*g*). For removing the ground product, radial arms are arranged on the trom-

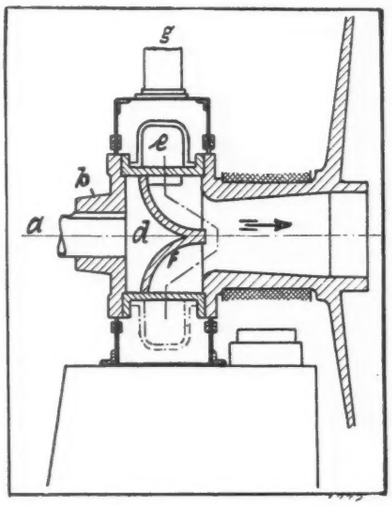


Fig. 3. Feeding material through the hollow trunnion.

mel wall, and during the rotation of the mill these arms deliver the material onto cone (*k*), as in Fig. 4. The central piece (*l*) contains a number of slots, through which the ground product reaches the screens (*m*) and (*n*).

In order to increase the force of the impact of the balls and thus the capacity of the ball mill, and so to be able to grind harder material in a mill of small diameter, the barrel must be

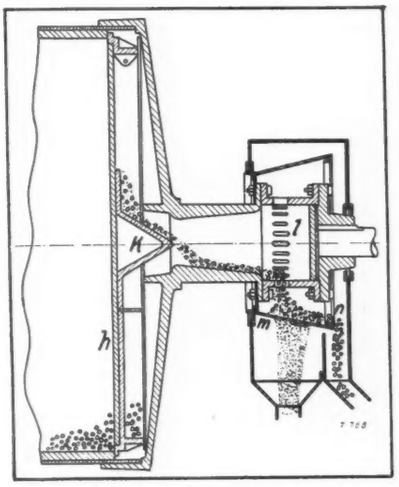


Fig. 4. Radial arms are arranged in this mill to deliver the material from the mill to the cone "k."

Length of Barrel (*mm.*)	Width of Barrel (*mm.*)	Speed of Rotation (*r.p.m.*)	Power Consumption (*h.p.*)	Capacity (*kg. per hour*)	Weight (*kg.*)
500	300	50	1	50	600
700	400	45	2	100	750
900	500	40—35	2—3	300	1300
1000	700	35—30	4—5	500	2000
1200	800	30—25	6—7	800	3000
1400	1000	30—25	8—10	1000	5000
1700	1000	25—20	14—16	1500	8000
2000	1200	25—20	20—25	2000	14000
2500	1200	25—20	25—30	3000	18500

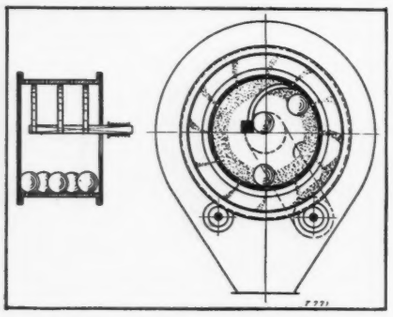


Fig. 5. Device for diverting balls makes possible higher speed and better grinding action.

rotated at increased speed. As mentioned at the beginning, the balls and charge in this case tend to form under the action of centrifugal force a mantle which lies fast against the inner wall of the mill. A free fall of the grinding elements is no longer possible, and thus almost all grinding action is lost. The impact of the balls is composed of the height of fall, the weight of the balls, and the energy which is imparted to the balls through the rotation of the barrel. This energy increases with increased speed of rotation of the barrel. By means of a device for diverting the balls (Fig. 5) it is possible to obtain a good grinding under the conditions previously outlined. In the upper half of the barrel is a row of prongs curved in the manner of a sickle, spaced at intervals smaller than the diameter of the balls. While the material being ground passes between the prongs, the balls are retained and fall back to the bottom of the barrel. ING. J. WINKEL in *Tonindustrie Zeitung*, 55:170-171, Feb. 9, 1931.

Successful Use of Color in Concrete Depends Upon Proper Pigments

By WILLIAM J. REARDON
Reardon Color Works

COLOR is a human necessity. All nature is endowed with color. Field, sky, sea, sparkling cataract and brilliant sunset are colored to charm the eye of man. The architectural urge to employ color is rapidly increasing. Brilliant shades, soft tints and flooding lights are now being used to bring the quality of color into play in the monumental building and the wayside home.

Buildings of all kinds are largely built of cement. The cement is used where the eye rests upon it, in walk and wall and roof of tile. Here is a demand for color. If cement can not be colored to advantage, other materials having this characteristic will supplant it in many ways. The manufacturer of cement should be interested in the successful coloring of his product. This is the age of color in building.

The advantages of concrete in strength, economy and endurance are handicapped by its drab, colorless appearance. The excellence of a concrete road from every standpoint is only dimmed by its unending sameness. If country bridges, walls, sidewalks, floors and the mortar in brickwork could reflect the charm and variety of color, cement truly could be called the greatest building material in the hand of man. It is true that much has been done in this direction, but it is also true that we are far from the objective, and that many errors must be corrected before color comes into its own.

Through the aid of private chemists, and such admirable bodies as the Portland Cement Association and the American Concrete Institute, the way has been plotted to a wide and successful use of color. Colors mined from the ground and which contain impurities of the earth and filler, clays, aniline dyes, vegetable bases and practically all the known soluble colors should be eliminated. Some soluble colors are now being developed, but the stamp of practical success is not yet upon them. Colors made from waste products, under the supposition that anything can be thrown into cement, should be discarded. Analyses of this class of color show that such foreign substances as coal, clay, etc., are present in damaging percentages. They kill the cement, fade in the sun, and bring general dissatisfaction. Paints are but temporary membranes. Cement deals harshly with them chemically, and joins with wear and weather in their rapid decomposition.

Insoluble, integral colors are the only successful colors for cement. These should be manufactured iron oxides of the highest purity for all colors except green. Chromium oxide is the only green which will hold its color in cement. The sidewalks of one of the main thoroughfares in New Orleans are laid in green. Treatment in the manufacture of these oxides to a great extent governs their success. Inferior colors at low prices ruin the job and spoil the public taste for color in cement. The owner who finds a "whisker" pink, where he expected a brilliant red, will blame the cement, the color, and the contractor.

The soluble salts, which are present in many cements and appear against a colored background as efflorescence, retard perfect color satisfaction. If these soluble salts could be considerably reduced by the cement chemists, greater satisfaction would result. Only the best colors and the coöperation of the cement chemists can bring success. It is true that skill in application decidedly influences the results, but education can overcome this difficulty.

The conclusion from our wide investigation in this country and abroad and the findings of the Portland Cement Association clearly show that only pure manufactured, insoluble colors should be used.

The day of color satisfaction in cement is at hand. The wide and beautiful varieties of face brick being produced to-day can now be laid in mortar of permanent and harmonious colors, because pure concentrated mortar colors are now available. The artificial and undesirable appearance of common concrete pavement leading from the home can be changed to include a carpet strip of red which carries its human warmth to the very street. The ill-appearing drives leading to the garage can be colored green to match the landscape. The bridge which spans the country stream can be tinted to harmonize with its surroundings. In truth, cement, the arm of strength, will also wear the raiment of refinement.

New Corporations

SAN JOSE CEMENT CO., LTD., Wilmington, Del. $18,250,000.

PIQUA STONE PRODUCTS CO., subsidiary of Ohio Marble Co., Piqua, Ohio, recently formed to produce crushed stone for road building purposes. Officers are: Mrs. M. F. Hall, pres.; A. Acton Hall, v.-pres.; George W. Berry, sec.-tr.

CAMPBELL STONE CO., Afton, Mich. $200,000.

CUSTER SAND & GRAVEL CO., Custer, Wis. $10,000. Jos. G. Goetz, Owen T. Gross, Rene C. McMahon, H. P. Vanderloom.

PACIFIC GYPSUM CO., Portland, Ore. $250,000. A. B. Myers, R. E. Hendricks and L. H. Myers.

PIRU ROCK CO., LTD., Los Angeles, Cal. $200,000. Hugh W. Jones, George H. Grabe of N. Hollywood, and J. H. Lemmon, Piru, Cal.

LOCAL SAND & GRAVEL CO., Mineola, N. Y., formed by merger of Hendrickson Bros., Inc.; George H. MacLeod Corp.; Seaford Sand & Gravel Corp.; Westbury Sand & Gravel Co., and C. V. Service, Inc. Officers are: Frank Hendrickson, pres.; George H. MacLeod and Charles F. Young, v.-pres.; Walter E. Smith, sec.; Ralph S. Caldwell, tr.; Arthur J. Hendrickson, director. Offices are located at Jericho Turnpike and Mineola Blvd., Mineola, N. Y.

MARION GRAVEL CO., INC., Marion, Ind. New corp. $25,000. Frank L. Deer, Leon L. Deer, S. G. Cohen, L. A. Young and Walter Fudge.

PARRY ROCK & SAND CO., INC., West Palm Beach, Fla. V. D. Stone, Harvey Bldg., West Palm Beach, T. H. Parry and G. Lewis. To produce stone, sand, cement, etc.

BUCKLEY SAND & GRAVEL CO., 160 N. LaSalle St., Chicago, Ill. $50,000. Raymond Pregenzer, James A. Buckley, H. J. Voss.

Recent Patents

AMERICAN

Cement and Concrete

Apparatus for heating cement raw material. David J. Uhle and Max E. Grunewald, Allentown, Pa. No. 1,801,467.

Liquid tank for concrete-mixing apparatus. James E. Bushnell, North Plainfield, N. J., assignor to Ransome Concrete Machinery Co., Plainfield, N. J. No. 1,801,763.

Process of making Portland cement. Richard W. Cheesman, Raleigh, N. C. No. 1,802,196.

Crushing and Grinding

Hammer-mill. Charles A. Jamison, Philadelphia, Pa., assignor Pennsylvania Crusher Co., same place. No. 1,801,604.

Hammer crusher. George W. Borton, New Lisbon, N. J., assignor to Pennsylvania Crusher Co., Philadelphia, Pa. No. 1,802,105.

Excavating

Excavating apparatus. John W. Page, Chicago, Ill. No. 1,802,063.

Conveyor-bucket. William H. Bosworth, Yonkers, N. Y., assignor to George Haiss Mfg. Co., New York, N. Y. No. 1,802,106.

Sand-scoop. Thomas H. Sly, Dunmore, Scranton, Pa. No. 1,802,223.

FOREIGN

Cement and Concrete

Magnesium Portland cement. Karl Balthasar, Klagenfurt, Austria. Canadian 310,518.

Crushing and Grinding

Coal crusher. The Jeffrey Manufacturing Co., Ltd., Montreal, Que., assignee of Walter J. Armstrong, Columbus, Ohio. Canadian 310,673.

Method of grinding cement materials. F. L. Smidth & Co., New York City, assignee of Carl Pontoppidan, Copenhagen, Denmark. Canadian 310,710.

Hammer mill. Edward Corydon Rich, assignee of Harry B. Masters, Keokuk, Iowa. Canadian 310,736.

Apparatus for distributing crushed product. Martin Bemmann, Zschoppach, Germany. German 523,780.

Centrifugal ball mill. Babcock & Wilcox, Ltd., London. German 523,650.

Ball mill in which a current of gas is led through the ball charge. Societe Francaise de Constructions Mecaniques (Anciens Etablissements Cail), Paris. German 523,651.

Ball or tube mill. Edward Giles Stone, Wollongong, Australia. German 523,652.

Pulverizing apparatus. Riley Stoker Corp., Worcester. German 524,146.

Spring-roller mill. Berliner Stadtische Elektrizitatswerke Akt.-Ges. and Wilhelm Hofstetter, Berlin. German 523,974.

Roller crusher for grinding sand. Maschinenfabrik Ratzinger & Weidenkaff, Munich. German 524,055.

Crushing or grinding apparatus. Swinfen Bramley-Moore, New York. German 524,056.

Drilling

Drilling apparatus. The Sullivan Machinery Co., assignee of Morris C. Allen, Chicago. Canadian 310,449.

Process for lowering drill holes by means of gravel pumps. Walter Brechtel, Ludwigshafen A. Rh., Germany. German 523,514.

Drive for deep drilling apparatus. Dipl.-Ing. Gerhard P. Lehmann, Campina Jud. Prahova, Rumania. German 523,687.

Compressed-air drill. Ingersoll-Rand Co., New York City. German 523,905.

Drying

Drying apparatus. Buford Bosia Russell, Chicago, and Walter John Uhlhorn, Oak Park, Ill. Canadian 310,516.

Rotary drier. Maschinenfabrik Buckau R. Wolf Akt.-Ges., Magdeburg, Germany. German 523,685.

Process and device for production of a hot air and gas mixture, particularly for drying purposes. Heinrich Ullrich, Beierfeld, Germany. German 523,784.

Rotary drier. Maschinenfabrik Imperial G.m.b.H., Meissen, Saxony. German 500,146.

Rotary drier. Gustav Honnicke, Berlin. German 524,421.

Gypsum

Apparatus for making plaster wallboard. The Canadian Gypsum Co., Ltd., Windsor, N. S., Canada, assignee of The United States Gypsum Co., Chicago. Canadian 310,837.

Kilns

Tunnel-kiln cars. The New Castle Refractories Co., assignee of George Delbert Morris, New Castle, Pa. Canadian 310,891 and 310,892.

Process for withdrawing lump materials from shaft kilns. Wilhelm Eckardt & Ernst Hotop G.m.b.H., Berlin. German 523,348.

Rotary kiln for the burning of cement with damper device for the gases. Fried. Krupp Grusonwerk Akt.-Ges., Magdeburg-Buckau, Germany. German 523,578 and 523,579.

Regulating device for the air or gas discharge from rotary-tube-type machines. Fried. Krupp Grusonwerk Akt.-Ges., Magdeburg-Buckau, Germany. German 523,580.

Chamber-ring-kiln with grate firing. Bornkessel & Co. m.b.H., Minden i. W., Germany. German 523,245.

Ring kiln. Guglielmo Piperno and Adolfo Carena, Turin, Italy. German 524,070.

Material-Handling

Overhead cableway system. Lidgerwood Manufacturing Co., Elizabeth, N. J., assignee of Joseph Haines Dickinson, Winter Park, Fla. Canadian 310,421.

Dump car. The Pressed Steel Car Co., Pittsburgh, assignee of Nathaniel Sutherland Reeder, New York City. Canadian 310,701.

Scraper. William V. Hutchinson, La Mesa, Calif. Canadian 310,770.

Bins for handling bulk materials. J. Pohlig Akt.-Ges., Koln-Zollstock, Germany. German 523,684.

Conveyor installation. C. Aug. Schmidt Sohne, Hamburg, Germany. German 524,089.

Belt-conveyor apparatus. Lorenz Schafer and Dipl.-Ing. Hermann Weber, Dusseldorf, Germany. German 524,413.

Drive of shaking conveyor. Dipl.-Ing. Gustav Rozycki, Kattowitz, Polish Upper Silesia. German 524,414.

Conveyor, particularly for small granular or pulverulent materials. Ferdinand Kaiser, Uerdingen a. Rh., Germany. German 524,415.

Mixing

Weighing mechanism for concrete mixers. The T. L. Smith Co., assignee of Walter L. Hart, Milwaukee. Canadian 310,443.

Apparatus for charging concrete mixers. Porter W. Yett, Portland, Ore. Canadian 310,605.

Process for mixing and aerating slurries, semi-liquid and fluid materials. Roland Edward Minogue, Manitowoc, Wis. German 523,746.

Concrete mixer. Koehring Co., Milwaukee, Wis. German 524,322.

Liquid measure, particularly for concrete mixers. Otto Lang and Wilhelm Siebermann, Mosbach, Baden, Germany. German 524,323.

Mixer, particularly for building materials. Dr. Paul Wetzel, Karlsruhe, Bavaria. German 524,346.

Pumping

Centrifugal pump. Frank B. Allen, Philadelphia. Canadian 310,517.

Screening and Separating

Screening apparatus. The Productive Equipment Corp., assignee of Lewis E. Soldan, Chicago. Canadian 310,702.

Hydraulic coal and ore washing and separating machine. The Wilmot Engineering Co., Hasleton, assignee of Charles F. Richards, White Haven, Pa. Canadian 310,918.

Hopper feeding and screening mechanism for sand, crushed stone, etc. Sidney Mills and Alfred Johnson, Manchester, England. Canadian 310,921.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Manufacturers' Publications

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Air Compressors

Four Air Compressors Went to School. 16 p. Illustrated. (Davey Compressor Co., Inc., Kent, O.) Describes, in an interesting manner, the tests, and results obtained by these tests, on four air-cooled air compressors at the Case School of Applied Science.

Cars

Automatic and Remote Control Cars. 12 p., 8 ill. (Bulletin No. 1239. The Atlas Car & Manufacturing Co., Cleveland, O.) Describes and illustrates remote control quarry cars and full-automatic cars for use in the cement and other non-metallic mineral industries.

Concrete Carriers

Cutting Concrete Mixing Costs—with Safety. 16 p. Illustrated. (Leach Co., Oshkosh, Wis.) Describes and illustrates a new open-top truck mixer for hauling and mixing concrete from materials loaded at a central proportioning plant. Features of the new carrier include double-trough rubber-tipped paddles, grit-proof anti-friction bearings, tarpaulin top for wet-weather hauling and control of the mixing water.

Conveyors, Screw

Jeffrey Spiral Conveyors. 48 p. Illustrated. (Catalogue No. 495. The Jeffrey Manufacturing Co., Columbus, O.) Describes and illustrates a complete line of spiral conveyors for handling loose, bulky materials. Six principal types are listed: sectional flight, helicoid, mixer, cut flight, ribbon, and cast iron.

Couplings

Fast's Self-Aligning Coupling. 36 p. Illustrated. (Coupling Division, The Bartlett-Hayward Co., Baltimore, Md.) Describes and illustrates a flexible coupling which provides mechanical compensation for misalignment in shafts.

Crushers

Type TZ Reduction Crusher. 20 p., 10 ill. (Bulletin No. 110. Traylor Engineering & Mfg. Co., Allentown, Pa.) Describes and illustrates a new heavy-duty gyratory crusher built in six sizes capable of hourly production ranging from about 15 tons in the smallest machine to nearly 1,000 tons in the largest. Adjustment range is 50 per cent. in each machine.

Electrical Equipment

National Carbon Products. 24 p. Illustrated. (Carbon Sales Division, National Carbon Co., Inc., Cleveland, O.) Describes and illustrates a complete line of carbon, graphite and metal-graphite brushes for generators, motors and rotary converters.

Hoists

Chisholm-Moore Material Handling Equipment. 34 p. Illustrated. (Bulletin No. 32-B. Chisholm-Moore Hoist Corp., Tonawanda, N. Y.) Describes and illustrates a line of electric hoists for every industrial purpose. Complete data tables for each model included.

The Type 12 Euclid. 4 p., 11 ill. (The Euclid Crane & Hoist Co., Euclid, O.) Describes and illustrates a compact, yet powerful electric hoist fitted throughout with Hyatt roller bearings.

Lo Hed—the Electric Hoist that Operates in the Minimum Headroom. 16 p. Illustrated. (American Engineering Co., Philadelphia, Pa.) A booklet which describes in close detail the features of an electric-driven hoist with a wide application in industrial plants.

Plant Equipment

Manitowoc General Equipment. 16 p. Illustrated. (Manitowoc Engineering Works, Manitowoc, Wis.) Describes and illustrates the application of the plant equipment made by this concern. Included are boilers, dump cars, slurry agitators, rotary kilns and coolers, tube and compartment mills, flue-dust feeders and the Bendy kiln-feed control system.

Roller Bearings

Heliflex. 36 p. Illustrated. (Catalogue No. 40. Roller Bearing Co. of America, Trenton, N. J.) Describes and illustrates roller bearings with both solid and split inner and outer races. Complete specification tables are included.

Speed Reducers

Cleveland Worm Gear Reduction Units. 20 p. Illustrated. (Bulletin No. 108. The Cleveland Worm & Gear Co., Cleveland, O.) Describes and illustrates worm-gear speed reducers built and marketed by this concern and shows the machines in use driving rotary driers, conveyors, etc.

Worm Gear Speed Reducers. 48 p. Illustrated. *Planetary Speed Reducers.* 48 p. Illustrated. (Gears & Forgings, Inc., Cleveland, O.) Two new bulletins which describe and illustrate complete lines of two popular types of speed-reduction units.

BUILDING-MATERIAL PRICES, APRIL 1, 1931

Data collected by the Bureau of the Census and prepared by the Division of Building and Housing, U. S. Bureau of Standards.

City	Portland Cement (*bbl.*)	Gypsum Plaster (*ton*)	Gypsum Plaster Board (*1,000 sq. ft.*)	Hydrated Lime (*ton*)	Building Sand (*cu. yd.*)	Crushed Stone (*ton*)	Roofing Slate (*100 sq. ft.*)
Akron, O.	$2.67	.....	$36.00	$18.00	$1.85	$1.85	.....
Albany, N. Y.	2.70	$17.10	24.75	15.75	1.85	1.85	.....
Atlanta, Ga.	2.10	16.90	.....	15.00	2.50	2.75	.....
Baltimore, Md.	2.40	14.50	25.00	13.50	2.25	2.50	$10.00
Buffalo, N. Y.	2.95	16.00	21.00	18.00	2.50	2.05	12.00
Canton, O.	2.95	.....	.....	16.00	2.50	3.00	.....
Chicago, Ill.	2.40	16.00	21.00	17.00	2.00	2.00	.....
Cincinnati, O.	2.30	.....	24.75	14.40	2.63	2.55	.....
Cleveland, O.	1.85	14.50	.....	12.00	1.25	2.15	16.00
Columbia, S. C.	2.32	14.40	35.00	12.00	1.50	2.75	12.00
Columbus, O.	2.35	14.40	35.00	12.00	1.50	2.75	14.00
Denver, Colo.	2.20	18.00	35.00	22.00	1.25	1.45	.....
Des Moines, Iowa	3.08	.....	.....	20.00	1.10	.....	.....
Erie, Pa.	2.20	16.00	22.50	16.00	2.00	.....	.....
Fairmont, W. Va.	2.80	18.00	35.00	16.00	3.15	3.50	13.00
Grand Forks, N. D.	3.00	20.00	.....	25.00	2.60	.....	.....
Haverhill, Mass.	2.80	18.50	25.00	18.00	.....	.....	.....
Kansas City, Mo.	2.10	15.00	25.00	24.00	1.76	2.25	17.00
Lansing, Mich.	2.15	16.50	.....	18.00	2.10	.....	.....
Los Angeles, Cal.	2.30	15.20	.....	28.50	1.85	1.90	.....
Louisville, Ky.	2.32	17.00	.....	15.50	2.20	2.43	15.00
Milwaukee, Wis.	2.08	15.20	22.00	14.00	1.50	1.50	.....
New Bedford, Mass.	2.80	16.50	24.00	16.50	1.75	3.00	.....
New Haven, Conn.	2.90	.....	.....	20.00	1.25	2.25	.....
New London, Conn.	2.80	18.00	25.00	18.00	1.50	2.40	.....
Paterson, N. J.	2.40	17.50	25.00	18.00	1.50	2.10	14.00
Philadelphia, Pa.	2.30	17.50	.....	14.50	1.75	2.60	9.75
Poughkeepsie, N. Y.	2.18	.....	.....	.....	2.25	2.00	.....
Richmond, Va.	3.10	20.00	31.00	17.50	1.95	2.45	13.00
Rochester, N. Y.	2.85	17.00	22.00	20.00	1.75	2.40	12.00
Rockford, Ill.	2.80	16.00	25.00	20.00	1.60	1.15	.....
St. Louis, Mo.	2.15	18.00	.....	18.00	1.35	1.00	13.00
St. Paul, Minn.	2.45	18.00	.....	18.00	2.23	1.75	13.00
Saginaw, Mich.	2.30	17.00	25.00	18.00	2.50	3.25	14.40
San Antonio, Tex.	2.60	19.15	.....	20.00	2.25	2.35	.....
San Francisco, Cal.	2.60	19.90	.....	22.50	1.40	1.60	16.00
Scranton, Pa.	2.80	19.00	.....	20.00	3.25	.....	.....
Seattle, Wash.	1.60	20.00	.....	22.00	1.40	1.90	.....
Shreveport, La.	3.20	22.00	39.00	.....	2.00	3.80	15.00
Sioux Falls, Ia.	3.00	15.00	.....	24.00	1.25	2.25	.....
Syracuse, N. Y.	2.55	15.00	25.00	13.00	2.00	1.70	9.85
Tampa, Fla.	2.80	.....	.....	24.00	2.75	.....	.....
Terre Haute, Ind.	2.60	18.00	28.00	18.00	1.50	3.00	13.25
Toledo, O.	3.00	14.50	20.00	16.00	2.00	2.50	.....
Trenton, N. J.	1.94	17.50	25.00	18.00	1.15	1.80	14.00
Tucson, Ariz.	3.37	17.70	.....	30.00	1.25	2.00	.....
Washington, D. C.	2.08	16.00	25.00	13.00	.....	.....	.....
Waterbury, Conn.	3.00	20.00	30.00	20.00	1.35	2.45	15.00
Youngstown, O.	2.95	.....	.....	20.00	3.75	2.50	.....

Insurance Problems Discussed

Life Insurance During Periods of Depression

"Life insurance is about all they have left."

So often do we hear this remark made about business men today. Business losses, the stock market and lack of orders have all had their part in shrinking our capital, assets, and life insurance—to which men are tenaciously clinging—is the only investment that has not depreciated a cent in either its cash value or its benefits.

The present high regard for life insurance has its roots in the palmy days of "Coolidge prosperity." Whenever you buy an ordinary life insurance policy, you buy two things at the same time. You buy immediate protection for the face amount of the policy, of course. And in addition you build up a reserve which grows like an investment and is always available as a cash or loan value. The lessons of 1929 and 1930 have made the dividends and other savings features of insurance seem attractive, and people today are interested in it for its investment possibilities as well as for pure protection.

Always Say "No"

Have you ever thought what you, as a potential buyer of life insurance, look like to the agent who is trying to sell you a policy? Very few people are all ready to sign up on the dotted line the minute an insurance man walks in. Your natural reaction to the salesman is "No." Not that down in your heart you think he is wrong. But he disturbs your peace. He wants you to face the bald possibilities of your family's future and to curtail some luxury in order to take care of that future. You say "No" because you do not want to have to decide the question he is putting to you.

In trying to avoid their own consciences, men used to think up clever rebuttals to show why they did not need more insurance. While the agent was talking, they listened absent-mindedly and focussed their attention secretly on inventing some incontrovertible objection to the plan. Each man thought his own objection just fitted the case and was quite original. Yet all the objections that have ever been thought up are only variations of ten fundamental objections, and every experienced life insurance agent knows the exact answer to your smart replies.

"Can't Afford It"

One does not hear the old objections very much in 1931. Business men admit without argument that they are underinsured, that their families need more protection, and that insurance came through the economic slump with such a solid reputation that they agree to its preëminence as an investment. "But," they invariably conclude today, "I can't afford it." Funny—or rather incredible, it is to the older insurance men. No sales resistance of the old sort, no objections—everyone wants more insurance but says he cannot pay for it.

Now this "can't afford it" argument is worth examining because it is typical of mob psychology. With very few exceptions people really mean it when they say it. You do not have to lie to a salesman; you can get rid of him more easily and directly. But though people are honest in intent when they say they "can't afford it," they usually are handing out a snap answer without having given their family situation an up-to-date analysis. That is mental inertia. It is simpler to forget about the proposition than to think it clear through.

Still Buy Necessities

Those who quite honestly tell the agent they cannot afford insurance at times like this fall largely into two groups. The first are those who simply know they are already spending all they have. If you stop to think of it, you realize that nobody has any free money. Everyone's entire income is already spoken for, either as living expenses, luxuries and advancements or investments. You cannot take on a new investment without eliminating something else. The fundamental question should be, "Am I spending money for anything that is less important to me than more protection for my family's future?" You never would buy insurance if you waited to have some free money in your pocket. You will find a means to get a policy, however, any time you discover some less essential item among your present purchases, because even in the depression people are still buying the necessities of life and even such luxuries as strike closest to their hearts.

Salary Cuts

The second group of honest doubters includes most of the men whose incomes have been reduced. It is tragically true that most independent contractors have had their profits cut and many salaried men have had their salaries sliced ten per cent. If your income is nine-tenths what it was in 1929, you should be well off because the prices of consumers' goods (food, clothing, jewelry, books, entertainment, etc.) have come down more than ten per cent, and you are relatively better fixed than you were. A man was overheard describing an argument with his wife about his mother-in-law. "Your mother," said the wife, "is so old-fashioned she thinks of things in terms of 1913 prices that are clear out of date." "Why, no, my dear," answered the husband, "you are the one who is old-fashioned and out of date; you are spending money according to the standards of 1929." Many men can fit in additional insurance if they will study the family purchasing methods carefully.

Should Buy at Bottom

Let an insurance agent go to a business man in "boom" times and the prospective purchaser will probably be rather free in taking on a new policy. Yet the soundest principle for building up your insurance protection is to do your buying when your income is at the bottom of the economic swing. If you can squeeze in the premium today, you will not have trouble continuing it in more prosperous years. But if you buy your insurance at the top of a "bull market" income, you may find yourself completely swamped in lean years and you may be compelled to let your policy lapse, which means a permanent loss to you and your family.

"Hard Times" Policies

For those who want to secure more protection for very little immediate cash outlay, we should note that there are many policy forms well adapted to present conditions. There is, for example, the five-year convertible term policy issued by most companies. At the average age you can get $10,000 of this insurance for a premium of eight or ten dollars a month, and you can transfer it to ordinary life any time within five years. In other words, you get the protection immediately at a small cost in keeping with your present buying power, and when business conditions improve you can switch over to ordinary or twenty-payment life or endowment insurance without a physical examination or any other "red tape."

Whiting Corp. Subsidiary Buys Pulverizer Rights

The Grindle Fuel Equipment Co., Harvey, Ill., a subsidiary of the Whiting Corp., has acquired all sales and manufacturing rights to the Bethlehem pulverizer, formerly manufactured by the Bethlehem Steel Co., Bethlehem, Pa.

The Whiting Corp. is a well-known manufacturer of pulverizing equipment, cranes, automatic stokers and power-plant, foundry and railway equipment.

The Hill Clutch Machine & Foundry Co. has moved its New York offices from 30 Church St., to 90 West St. Arthur L. Whiteside continues in charge.

New Machinery and Supplies

Concrete Carrier with Open Top in Production

Recognizing the revolutionary advantages which the traveling-mixing method offers in concrete construction, and at the same time aware of all the problems it presents, the Leach Co. of Oshkosh, Wis., after two years of rigorous field testing, has developed a new type of truck mixer.

An open top is one of the big advantages claimed for the Leach Travel-Mix, as the new carrier is called. It allows the entire batch to be dumped from the hoppers instantaneously.

This, the Leach Co. claims, is an important advantage over truck mixers which must be loaded through the end or, more generally, through a hole in the center of the drum—both of which necessitate careful aligning with the bin chute before dumping and usually considerable rocking of the drum before the entire load can be accommodated. The open-top also permits easy inspection of the batch at any time.

The first and most important requirement of any concrete mixer is, of course, to get a thorough mix in as short a time as possible. By revolving in opposite directions—the two paddled mixers keep the aggregates passing from one trough to another across the center; and, in addition, the mixture is worked back and forth from one end of the mixer body to the other, alternating from one trough to the other.

The mixer, being driven by the engine of the truck, naturally requires some reduction in speed. A simple gear reduction, inclosed in an oil-type case like a regular automobile-type transmission, is provided for this purpose. All gears are properly hardened.

The transmission of power to each paddle shaft is by means of a heavy, hardened-steel roller chain which is fitted with an automatic tightener.

An exhaust heating system which can easily be attached to the muffler is provided. It keeps the water tank and bottom of the mixer body heated during freezing weather. The water feed around the top of the drum is self-draining and therefore requires no direct application of heat.

The truck mixer is provided with a tarpaulin top which, in case of rain, can quickly be fitted over the top of the body. When not in use, this covering can be rolled up in a small bundle and kept at the forward end of the mixer body.

All breakage and excessive wear by interference of stones has been done away with. The secret of this feature is the patented, rubber-tipped mixer paddles. These rubber tips are tempered to a special hardness that ordinarily deflect but little, but if confronted with large stones, they will bend enough to allow passage without any damage.

The truck has a capacity of 3 cu. yd. of mixed concrete and of 4½ cu. yd. when used as an agitator. The water tank has a capacity of 105 gal. and is fitted with a measuring glass calibrated to pounds and gallons. An auxiliary tank of 30 gal. capacity is provided. Anti-friction bearings are used throughout.

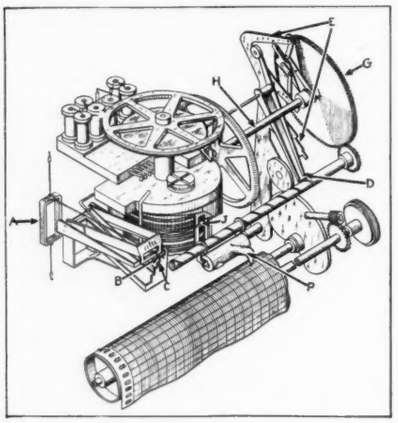
The new type concrete-mixing truck.

Potentiometer Pyrometer Has Many Improvements

A new potentiometer pyrometer in indicating, recording, multiple recording, and controlling types has been developed by The Brown Instrument Co., Philadelphia, Pa.

There are two general types of thermo-electric pyrometers—the millivoltmeter and the potentiometer. For certain requirements, the millivoltmeter type is more suitable, whereas for other requirements, the potentiometer type is preferable.

The new Brown potentiometer has some 55 features which are new in potentiometer pyrometers. High accuracy, easily maintained throughout the life of the instrument, was considered to be of prime importance in its design.



Operating principle of the potentiometer pyrometer.

The accompanying drawing illustrates the operation of the new potentiometer pyrometer, a Null-type potentiometer in which the galvanometer *A* directs the operation of mechanism to rebalance the circuit for each change in e.m.f. that is measured.

At intervals of every few seconds, the galvanometer pointer *B* is slightly clamped. A step on the selector table *C* rests gently against the pointer and positions a rugged secondary pointer *D*. The step lever *E* periodically moves downward into contact with the secondary pointer and rotates gear *G* secured to shaft *H*. The amount of rotation depends upon the position of the secondary pointer. The rotation of shaft *H* readjusts the slide wire contact *J* and simultaneously moves the pen *P*.

The galvanometer is designed to have a uniformly high responsiveness under all practical operating conditions. The balancing mechanism exerts no strain upon the galvanometer pointer and the mechanical movements of the secondary pointer are comparatively large. As a result, no adjustments are needed to take up the wear on either the pointer or contacting mechanism and the highest accuracy is maintained over long periods of continuous operation.

The charts and scales, 12 in. wide, were produced with great care to conform to the latest calibration values for iron-constantan, chromel-alumel, and platinum-rhodium thermocouples.

In order to derive full benefit from these carefully made charts, it is necessary to make suitable corrections for the natural expansion and contraction of the chart paper that takes place with changes in atmospheric humidity. It is because of this expansion and contraction that strip charts have oblong holes at one side of the paper. Such expansion and contraction can cause errors of over one per cent. of the reading of some chart ranges unless corrections are made. To eliminate such errors, a humidity compensator is built into the instrument and this automatically corrects the pen position and brings it into proper register with respect to the chart markings. Also, the charts are printed under a standard condition of humidity.

The new Brown potentiometer is believed to be the only recording instrument having this feature.

Speed Reducers Help to Make Filters Efficient

Among the many unusual uses to which the speed reduction units of the Ohio Gear Co., Cleveland, O., are put is that of maintaining the efficiency of modern dust-collecting equipment of the positive arrester type, such as those made by the Parsons Engineering Corp.

As is well known, there are two principal types of dust collectors—cyclone collectors and positive arresters. In the former, the dust is separated from the air by centrifugal force, and such collectors are therefore chiefly used to handle dust whose grains have mass enough to permit their being readily affected either by gravity or by the centrifugal force of the whirling air in the device. In the latter type, which is much more efficient in arresting the finer particles of dust, the dust-laden air is drawn through closely woven cloth by means of a suction fan. This cloth must be kept reasonably free from dust particles, otherwise the meshes of the fabric would rapidly become clogged, and the efficiency of the equipment would be greatly decreased. It is therefore necessary to have a shaking device or rapper on such dust collectors. These devices are practically always motor driven.

In view of the necessity of selecting a type of reducer gear which would reduce the high speed of the driving motor to the comparatively low speed necessary for the shaker arm, and which would be thoroughly dust and moisture proof under long periods of possible neglect, the Parsons Engineering Corp. recently installed a Type HS-1 ten-to-one Ohio Gear Co. completely enclosed ball-bearing speed reducer for test purposes on one or two of their dust collectors so that the gears could be thoroughly tried out under actual working conditions. It is stated that the results of several months' test have proved very satisfactory.

The improved portable belt conveyor.

Efficiency of Portable Conveyors Is Increased

Recent improvements have added to the efficiency of the portable conveyors built by the Burch Corp. of Crestline, O. These improvements have included increased strength in construction and a change in the manner of raising and lowering the elevator, a new type of hoist being employed.

The conveyor is strong and rigid, having a 1½-in. by 2-in. angle frame, securely trussed and bolted. The main unit is 20 ft. in length and is built in additional 6-ft. units. The wheels are 40 in. high and the tire is 3 in. in width. Belts from 16 to 24 in. wide may be obtained in 4-ply construction with a ⅛-in. rubber top.

Either electric or gasoline power may be had, as specified. The entire conveyor is lubricated by the Alemite pressure system.

Photo-Electric Tubes in Recording Instruments

Recording instruments such as voltmeters, ammeters, etc., have always been less sensitive than corresponding indicating instruments, the result of the mechanical burden placed upon the instrument by the recording pen. The inertia of such a weight has made it impossible for a recording instrument to respond as quickly or to as small a quantity as could an indicating instrument.

Now, by the application of a different principle, the General Electric Co. has produced recording instruments of increased sensitivity and accuracy. A beam of light has no weight, so, by incorporating photo-electric and pliotron tubes, in recording instruments, it has been made possible to record quantities where only a limited amount of energy is available.

In the photo-electric recorder the inking pen is driven by a small high-torque element supplied from an auxiliary source of energy. Directly beneath the recording element is an indicating instrument element that is operated by the quantity which is to be recorded. A photo-electric circuit and an optical system of special design cause the recording element to follow the indicating element and make a continuous record of the deflection. In this manner any quantity which may be indicated can also be recorded.

The only mechanical burden placed upon the indicating element is a tiny galvanometer mirror. For ordinary applications, miniature indicating instrument elements are entirely satisfactory, and result in a minimum energy requirement from the circuit which is being measured. The instruments can be of the most sensitive types.

The photo-electric circuit and optical system represent a distinct departure from past practice. Errors due to ordinary variations in supply voltage, photo-electric and pliotron tube characteristics, lamp intensity and other variables usually troublesome in such circuits have been practically eliminated. The filaments of the various tubes are operated at voltages well under their rating, insuring long life.

The energy taken from the measured circuit is extremely small, being only that amount necessary to operate the indicating element. Recorders can readily be constructed with a full-scale deflection of 20 microamperes, at which current the power requirement from the measured circuit is less than one microwatt. On the other hand,

there is no upward limit to the rating of the indicating element; the recorder is adapted to almost any type of service conceivable in measurement work.

The recorders now available can be obtained incorporating practically any of the General Electric Co. indicating instruments.

Wide Use of Alloy Steel in New Model Excavator

A new improved, full-revolving 1-cu yd. excavator known as the P&H Model 500, has just been announced by Harnischfeger Corp., Milwaukee, Wis. This machine, which spent the winter working in the test field, is now being put into production to be ready for delivery at a very early date.

The Model 500 follows the general P&H design with a number of added refinements. Main frames are unit-alloy steel castings. Wearing parts are of alloy heat-treated steels. Drums are in tandem and operate through the P&H power-clutch control. A minimum number of gear reductions makes this new machine extremely simple. Sturdy gasoline, Diesel, or electric motors provide ample power whether the machine is used as shovel, drag-line, crane, clam-shell, hoe, or skimmer.

Corduroy (crawler) frames are cast from alloy steel and are bolted directly to the car body. The crawlers employ the P&H double-sprocket drive directly engaging the link pins. Twelve pairs of alloy heat-treated rollers distribute the weight of the machine through the corduroy shoes to the ground. Corduroy shoes of various widths can be provided to meet different ground conditions.

The patented P&H chain crowd with fast return is used. Shovel boom is of sturdy, box-section construction. A 1-cu. yd. dipper with manganese-steel front and renewable, reversible teeth is standard.

The new 1-cu. yd. excavator.

Drag-line and crane booms are of trussed structural design. Equipped for drag-line operation, the Model 500 handles the bucket on a 40 ft. boom. As a crane with the same length boom, it is rated at 31,700 lb. at 12 ft. radius, which is 75 per cent of the tipping load.

A substantial, fully enclosed steel cab is standard. The entire machine is finished in attractive dark green enamel.

A bulletin describing the P&H Model 500 may be obtained by either writing to the main office of the corporation at Milwaukee, or to any branch office.

Belt-Dressing Compound Demonstrates Efficiency

The machine in the accompanying illustration shows in a vivid manner the increased efficiency of a belt treated with Cling-Surface, a belt-dressing compound made by the Cling-Surface Co., Buffalo, N. Y., over a similar untreated belt.

A 7½-hp. motor drives a 4 kw. generator, through a system of 3-in. light, double-ply leather belts. The generator belts, one treated and one untreated, run from 16-in. to 6-in. pulleys on 5-ft. centers. The load, consisting of a bank of 160 25-watt lamps (the brilliant section above the meter board at the right of the picture), being shifted to either belt by clutches.

Machine for testing efficiency of belt-dressing compound.

The Cling-Surface treated belt, running with an initial tension of only 8 lb. per in. of width (just enough to prevent fluctuation at its speed), showing a slack of 7 in., delivers a full 4 kw. load at speed of 1,750 r.p.m., the meter reading being 115 volts and 34.8 amp.

The untreated belt requires an initial tension of 35 lb. per in. of width to give speeds of from 1,610-1,630 r.p.m., the meter readings being 90 volts and 32 amp. even with such a tight belt.

Belt tensions are read directly by means of spring balances attached to dolly carriages carrying the jack-shaft.

The brilliancy of the lamps in themselves show the marked difference in efficiency, and this indication is borne out by the meter readings.

The demonstrating machine is proving to be an interesting spot to visitors at the various convention exhibits where it is being shown.

New Unit Motor Is Safe to Use in Wet Locations

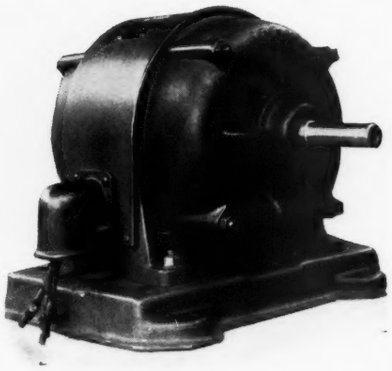
The Ideal Electric & Mfg. Company, Mansfield, O., continues to add to its well-rounded out line of Ideal motors of the unit type of construction. One of the latest developments is the Ideal drip-proof motor which is protected against water or other liquids dripping on it or splashed in through the ends.

In many places where it is necessary to use a water spray in operating, such as around sand-and-gravel working plants, the new motor is the practical answer to a long-felt need. Its action, as water is thrown into the motor, is to immediately discharge it through the vent at the bottom of the center enclosing jacket. Air circulation is from both ends towards the center and out through this vent.

Large shrouded fans located just inside the end brackets at each end of the motor produce the action which discharges the water. These fans catch any water entering through the end of the motor and throw it against

the inside surface of the bearing bracket. From here the water runs down the inside of the bearing brackets and out through the center bottom vent without coming in contact with the windings.

Should water, through unforeseen causes, get beyond the shrouded fans, the insulation is so prepared that an occasional wetting will not have any serious effect. The strong blast of air which is continually being forced



New unit-type motor.

through the motor while in operation is more than sufficient to immediately evaporate any water that may reach the windings.

The outer surfaces of the Ideal drip proof motor are such that water dripping from above cannot enter the motor. The end bearing brackets are so shaped that water dripping on them travels around the end and to the base without entering the motor. The shroud cover encircling the motor at the center effectively prevents the entrance of water at this point. This cover does not completely surround the motor but is open at the bottom to form the exhaust vent through which both air and water are discharged.

Roller Bearings in Self-Aligning Pillow Block

To meet the demand for a high grade, rugged, anti-friction bearing for service where loads exceed those ordinarily met in line-shaft service, Sprout, Waldron & Co. offers a new Hyattized ball-and-socket self-aligning pillow block. A new bulletin just issued says the pillow block consists

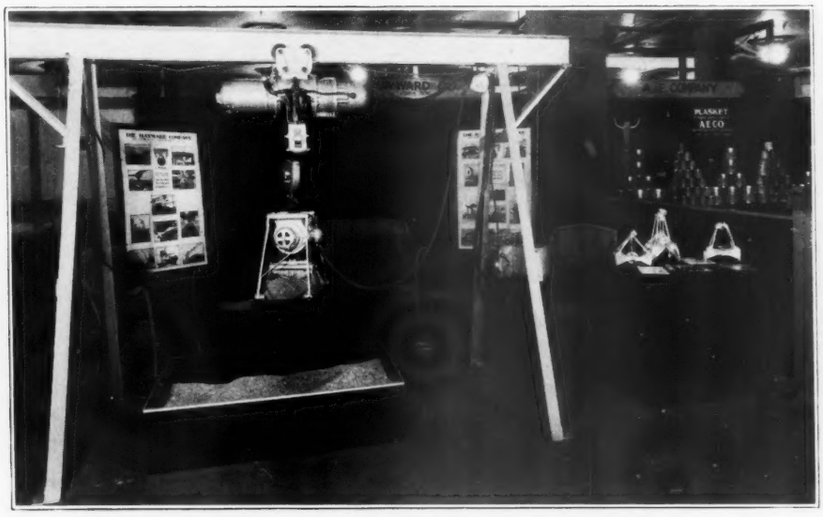
Self-aligning pillow block.

of one Hyatt heavy-duty roller bearing with solid, hardened and ground outer and inner races. This bearing unit is mounted in an accurately-machined, heavy, cast-iron ring which is turned on the outside to a perfect sphere. This ring containing the bearing is mounted in a heavy two-piece cast iron housing with internal machined spherical seat.

The complete unit is thus made self-aligning and equal distribution of the bearing load is secured along the entire roller. A copy of a bulletin describing this piece of equipment may be secured by writing to Sprout, Waldron & Company, Inc., Muncy, Pa.

Electric Motor-Driven Bucket Being Exhibited

One of the interesting exhibits at the recent Industrial Exposition held at Cleveland, O , was that of the Hayward Co. of New York, N. Y. A view of this company's booth is shown in the accompanying illustration. The equipment demonstrated is a model of



Electric-motor bucket model on display at exposition.

the Hayward electric-motor clam-shell bucket.

The bucket is of the hook-on type and is used in connection with hoisting equipment, having but a single hoisting line. The operator has complete control over the opening and closing of the bucket which, as the illustration shows, is operated by a built-in electric motor.

Motorized Countershaft Speeds Up Production

Some very interesting individual motorization applications have been made recently by the Production Equipment Co. of Cleveland, on old-type machine tools. These tools have all been single or cone-pulley driven, usually from overhead line-shaft drives.

The motorized countershaft manufactured by this company is made with an overhung-type base and box-type base, thereby providing standard type mountings which can be adapted to most any kind of machine.

One of the many definite advantages of the motorized countershaft is its ability to speed up production on the machine and turn out work that is better in quality.

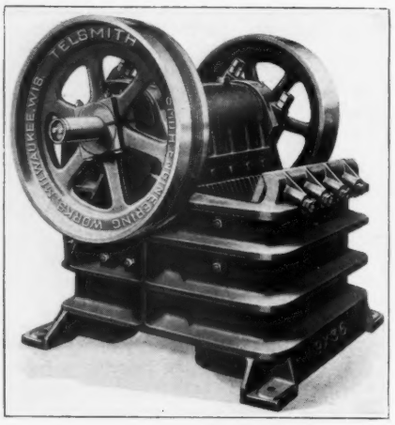
An installation on a 48-in. lathe reduced the hours of shaft turning on one job from 120 to 65. While all applications will not reduce the working time so much, it is certain that this practical improvement made to a machine will provide many advantages never obtainable with overhead belts driving from line shafting.

A new bulletin issued by the manufacturer describes many of the features of this equipment and illustrates a few applications.

New Features Added to Well-Known Jaw Crusher

In 1930, the Smith Engineering Works of Milwaukee, Wis., purchased the crusher department of the Wheeling Mold & Foundry Co., Wheeling, W. Va. The Wheeling organization had developed a line of steel jaw crushers equipped with anti-friction bearings. A large number of these machines were placed throughout this country and Canada. Before the Wheeling purchase, a careful investigation was made by Telsmith engineers, disclosing that the Wheeling jaw crusher had made an excellent field record. On account of its simplicity, large feed area, compact steel structure, easy adjustment and proven efficiency in fine reduction, Telsmith engineers decided that the crusher would prove a valuable addition to the Telsmith line.

As the canvass disclosed some features of the crusher which were capable of improvement, Telsmith engineers decided to make important changes in the bearings, adjustment, jaw clamping device and main structure. Externally, the Telsmith-Wheel-



Improved type of jaw crusher.

ing jaw crusher retains a strong family resemblance to its predecessor; but, in reality, this new machine is quite a different outfit—stronger, more reliable and more efficient, doing full justice to the Telsmith name plate.

The main structure is a box-like casting, made of annealed cast steel and reinforced by heavy horizontal ribs. Both walls and ribs have been increased in thickness, until breakage seems a remote possibility. The adjusting wedge and toggle block slide on planed surfaces. The front end of the frame is machined to take the stationary jaw die. The frame is bored —both sides in one process—to assure true and permanent alignment of the shaft and its anti-friction bearings.

The swinging jaw is made of annealed cast steel, with deep substantial vertical ribs. The front face is planed to fit the jaw die; and the casting is bored accurately to take the anti-friction bearings. A replaceable toggle bearing is inserted between the toggle and swinging jaw, protecting the jaw casting against toggle wear.

The eccentric shaft both supports and actuates the swinging jaw. As this shaft takes a considerable portion of the crushing load, it is made of hammered carbon-vanadium steel, large in diameter, accurately finished, ground and polished. The eccentric shaft is journaled in anti-friction bearings of the most advanced type. Thrust collars take all the wear due to end-thrust—frame and swinging jaw being thus protected against frictional wear. The entire shaft unit is readily removable merely by taking off the main bearing caps.

Messinger bearings, of the cylindrical type, are used in both swinging jaw and frame. The rollers are of heat-treated alloy steel, operating in races of the same material. Rollers and races are both ground with the greatest possible accuracy. The rollers are held in place by bronze retainer rings. Each roller-bearing is protected by piston ring seals, which prevent entry of dirt and loss of lubricant. The roller-bearings take only radial pressures, special collars being provided to take all end-thrust. The Messinger type of bearing is particularly well fitted for heavy-duty crushing service, being capable of carrying heavy loads.

Both stationary and swinging jaw plates are made of manganese steel, with the background to assure an accurate fit. Corrugated dies are furnished except for special cases. The dies are reversible. Both jaw plates are clamped rigidly in place by wedge blocks—no trouble with loose die plates.

This type of crusher has a peculiar crushing action. The upper part of the swinging jaw moves outward to crush the coarse rock—then retreats. As the upper stroke terminates, the lower portion of the jaw moves forward to finish the crushing action—then recedes as a new cycle begins. This crushing stroke has proven very effective, particularly in producing the smaller sizes—½-in., 1-in., and 1½-in. rock.

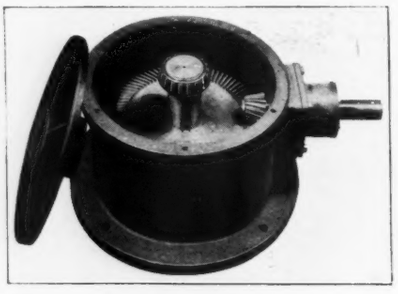
The length of the lower crushing stroke can be altered by changing the position of the toggle. The sliding toggle carries three toggle seats—the lower one for the short stroke, the middle one for an intermediate stroke and the top one for the long stroke, which is generally reserved for coarse rock and big capacity.

While the toggle adjustment affects the discharge opening to some extent, the size of finished product is usually regulated by the adjusting wedge and the sliding toggle block. This wedge-shaped block is raised or lowered by means of the adjusting screw and nut at the back of the crusher, thus moving the toggle block and swinging jaw forward or back, to decrease or enlarge the discharge vent. Adjustment can be made while the crusher is running. During operation, the adjusting wedge and sliding toggle block are wedged and bolted rigidly in place, preventing wear or breakage of the adjusting elements.

Vertical Speed Reducer Has Spiral Bevel Gears

A new type of speed reducer of the vertical, spiral-bevel type is announced by the D. O. James Manufacturing Co., Chicago, Ill.

This unit features smooth, noiseless operation and several novel advantages of design. The gears are made of chrome nickel of the spiral-bevel type to obtain greater efficiency from the improved tooth-form which provides more teeth in constant contact and a greater tooth bearing or pressure area in each tooth of given size. High efficiency is thus provided and a greater delivery of input power.



Vertical-type speed reducer.

Shafts are made of carbon steel and roller bearings are provided on both drive and driven shafts.

Where large ratios of reduction are required this type of reducer is made integral with a planetary reduction unit so that all ratios from 8 to 1 to 1,600 to 1 are available. They are made in sizes from ½ to 100 horsepower.

A well-designed housing prevents oil leakage and keeps dust and dirt from filtering into the unit, forming a neat, compact drive for use whenever vertical (up or down) driving is required.

Merco Nordstrom Valve Absorbs Dresser Mfg. Co.

Plans for the consolidation of the S. R. Dresser Mfg. Co., of Bradford, Pa., with the Merco Nordstrom Valve Co. into a new corporation to be known as the Dresser-Nordstrom Co. are revealed in a letter to stockholders of the Dresser Co. Directors of both companies have approved the merger.

The new corporation will have total assets of $5,913,482. Total capital stock and surplus will be $5,467,974, of which $3,202,500 will be represented by capital stock and $2,265,474 by surplus. The Dresser company is a well-known manufacturer of dredge-pipe couplings and other equipment.

Westinghouse Co. Issues 1931 General Catalog

A new general catalogue for 1931-1932 has just been issued by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The book is well bound and contains 1,300 pages, presenting a condensed description of all products manufactured and illustrates a large number of them.

A feature of the make-up of the new catalogue is an "instant index" at the center of the book. This, as well as a cross-index of each subject, at the beginning of that subject in the book, are printed on blue paper for guide reference.

The new catalogue covers about everything in the electrical line and is proving a valuable addition to any plant's library.

Bacon Succeeds Worden as Cutler-Hammer Head

At the recent annual meeting of Cutler-Hammer, Inc., manufacturers of electric control apparatus, Milwaukee, Wis., Frank R. Bacon, former chairman of the board, was elected president to fill the vacancy caused by the death of Beverly L. Worden. The office of chairman of the board was abolished.

Legal Information for Operators

When Seller May Collect Payment for Materials

A WISE man once said: "It is one thing to sell material and another thing to collect payment for it." In other words, it is better not to sell than to sell and not receive payment.

Probably the only practical and dependent rule, from which to determine in a particular instance whether payment for non-metallic materials can be enforced, is to keep informed of newly decided controversies of other sellers of non-metallic materials involving payment. By this plan sellers can readily avoid making mistakes which result in financial losses.

During the past few weeks the higher Courts in different localities have rendered several unusually important decisions on payment for non-metallic materials. For the reason that these cases clearly illustrate how losses from this source can be avoided, it is necessary briefly to review the cause and outcome of each controversy. Remember that by eliminating the cause you always avoid the controversy.

Official Personally Liable

Ordinarily, an official of a corporation is personally liable for payment of a debt which he fraudulently incurs, although such debt is assumed for the benefit of the corporation. In order that an official is liable for false assertions, made to benefit a corporation, it must be proved that the complaining party actually relied upon such statements when extending credit or making a contract.

For instance, in Lawson-Richards v. Blalock Co., 30 S. W. (2d) 797, it was disclosed that a man named Lawson had for many years been engaged in buying and selling cement, sand and gravel, and had frequently made purchases of Macatee & Sons. Lawson ceased business for a time about 1926, and later formed the Lawson-Richards, Inc., corporation, of which he was president, and under which he conducted the same business. Purchases from Macatee & Sons were continued, but the account was carried in the name of Lawson under circumstances which made Lawson personally liable, although the purchases were for the corporation.

About August this account showed an indebtedness to Macatee & Sons of approximately $2,000. Lawson-Richards, Inc., had a contract to furnish cement for a building. On March 8, Lawson ordered by telephone from the Blalock Company three cars of Portland cement at $2.50 per bbl. Lawson represented to Blalock, the company's president, that the cement was immediately needed to fill a contract. On the afternoon of March 8 the cement was delivered on the tracks to Lawson-Richards, Inc., and on the following day, or the day after, it was delivered by Lawson-Richards, Inc., to Macatee & Sons at $2.30 per bbl., in settlement of the above account.

The seller, the Blalock Co., sued Lawson to recover the amount due when the Lawson-Richards, Inc., became insolvent. Suit was based on the grounds that the corporation was a "mere pretense" created by Lawson to avoid personal liability for his debts; and that he bought the cement in order to use it to discharge his personal obligation to Macatee & Sons; and false representations that the cement was to be used in a building under a contract which Lawson-Richards had with the contractors.

However, on account of the fact that it was not proved that the Blalock Co. relied upon the statement of Lawson, the Court held the latter not personally liable, saying:

"The Court specifically found that Lawson did represent that the cement was to be used in a building under a contract which the corporation had with the contractors, but there was no finding that this constituted actionable fraud. In order to be such Blalock Co. must have relied upon it. . . . Regardless of the relations between Lawson and Macatees inter sese, Lawson was merely lending his credit to the corporation, and if he had personally paid the debt he would have been entitled to reimbursement from the corporation. We see no escape from either of these conclusions. They are elementary and need no citation of authority."

Liability for Payment

Ordinarily, a subcontractor is bound to pay for all materials which he accepts from a material man, unless the evidence clearly indicates that payment is not expected by the seller, or that the money has been paid to the party legally entitled to receive payment. For example, a subcontractor is personally liable to a material man for purchased non-metallic materials where it is agreed that the general contractor shall make payments from money due the subcontractor. This is true although the subcontractor does not receive payment from the general contractor.

In Carolina Portland Cement Co. v. Calhoun, 155 S. E. 151, it was disclosed that a subcontractor purchased non-metallic building materials under a contract of sale which provided:

"All the above material that has been placed in Orangeburg by the first of each month to be paid for as Calhoun (subcontractor) receives his check from Joseph W. Stout Company (general contractor)."

The subcontractor did not receive payment from the general contractor and gave an order on the general contractor to the seller for the money due. The general contractor failed to pay the material man and the subcontractor refused payment on the contention that the above clause in the contract relieved him from further obligations, particularly because the seller had accepted the order on the general contractor. However, the higher Court held the subcontractor liable, saying:

"The memorandum simply showed an effort on the part of the plaintiff to insure a payment as the defendant (subcontractor) collected from his debtor, the main contractor, and in no sense imposed a condition that limited the plaintiff (seller) or entitled the subcontractor to slip from under his obligation if the contractor failed to pay him. . . . An order upon a third party for the payment of money which has not been paid or accepted is not a payment of a precedent debt."

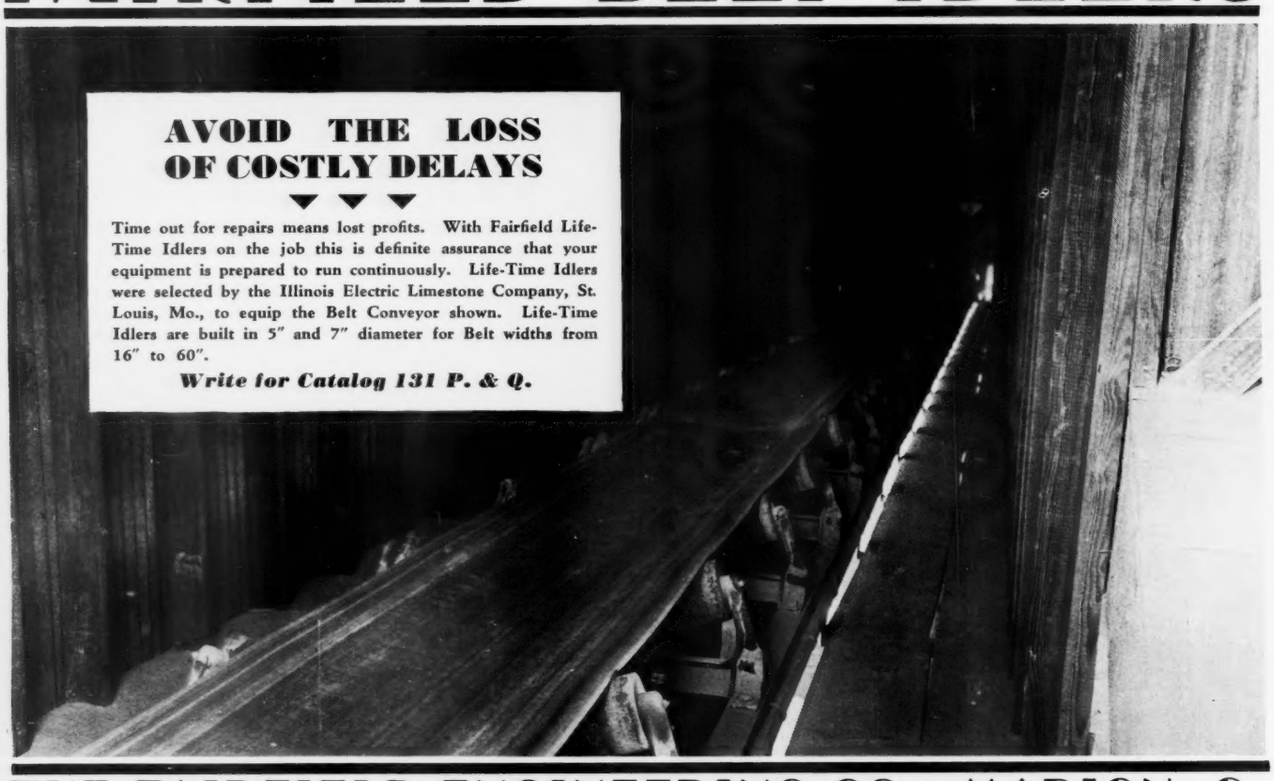
General Contractor Liable

It is well settled that a contractor by his conduct or statement may be estopped from asserting rights which might otherwise have existed, but, before he will be denied his usual rights it must be shown that another person has in good faith relied on such conduct or statements and has been thereby led to change his position for the worse.

For illustration, in Hot Springs v. Community Bank & Trust Co., 32 S.W. (2d) 427, it was disclosed that a contractor named Higgins entered into a contract with an owner for the erection of a building. Higgins sublet a part of the contract to a subcontractor who purchased certain materials from the Southwestern Marble & Tile Co. in the sum of $1,432.67, which materials went into the improvement. The subcontractor obtained an advance of money from a bank and wrote a letter to Higgins directing him to pay all money due and to become due on the subcontract to the bank without any suggestion that the bank was to see that the money advanced by it was properly applied in paying for labor and materials. The letter was accepted by Higgins as written without suggesting modification or change. Some difficulty arose over the question whether the subcontractor actually applied the money for labor and materials in construction of the building. The marble company filed a lien and suit was filed to hold Higgins, the general contractor, liable. In holding the latter liable, the Court said:

"The bank furnished the money sued for and did it on the faith of the letter written by Griffee (subcontractor) to Higgins, and there is nothing to indicate that the bank was to look after the distribution of the money, but the agreement was to advance money to pay for labor and materials."

FAIRFIELD BELT IDLERS



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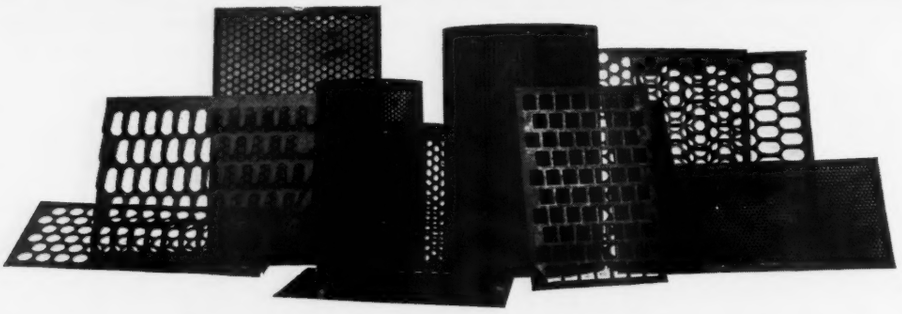

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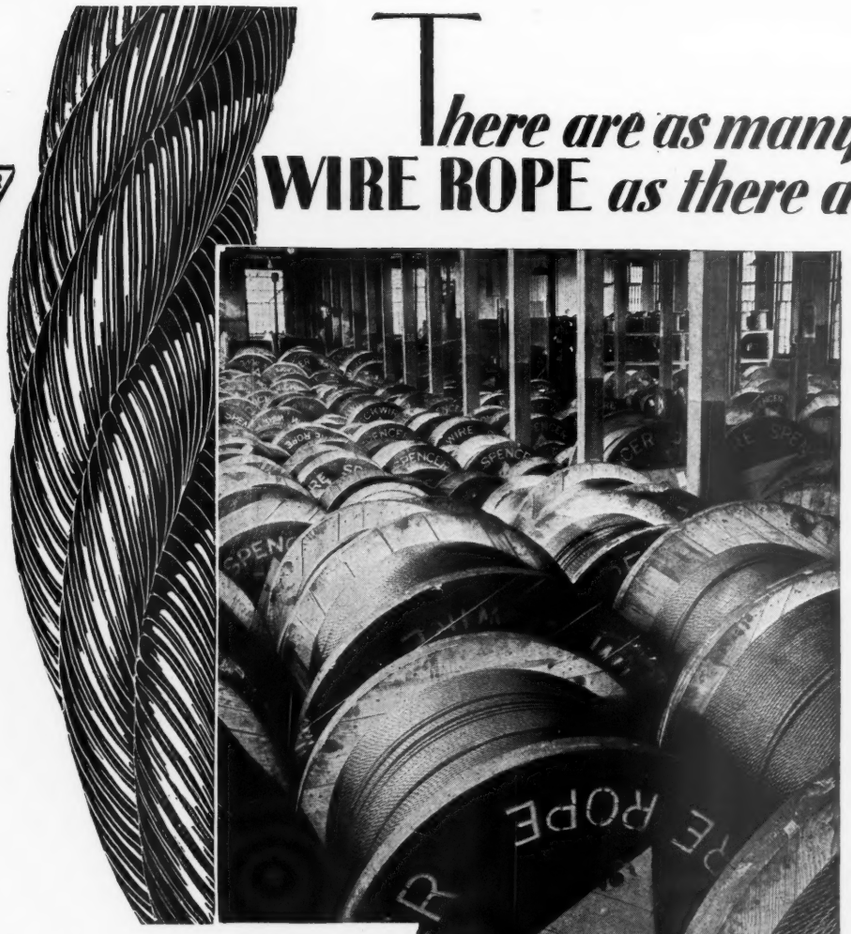

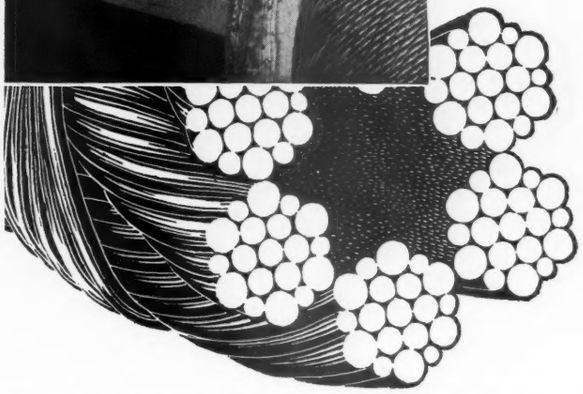

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